

The CRTeachings of Chairman Ted

Selections from the computer writings of Ted Nelson
in the 1960s and 1970s.

(c) 1965, 1967, 1973, 1974, 1978 & 1983 T.Nelson

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MEMO TO TED NELSON:

I have here only lightly quoted from Computer Lib and Dream Machines (at the end), and skipped the best quotes of Home Computer Revolution (the ones on the back cover). Headache and eyestrain. Must be done later.

Ted Nelson

13 Nov 83

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PREFACE

This needs a preface by somebody else.

What I would like this person to say is that I am one of the more quotable people in the computer field.

More than that, I would like this person to say that I am one of the more original people in the computer field, having thought through these matters in a firm and distinct way long before most people had the foggiest idea of what was going on with computers. And back when the computer people thought they were corporate locomotives, I wrote the first piece comparing them to movies ("Getting It Out of Our System.")

Such a person might also want to point out that my stuff contains a lot of surprises on rereading, even for the people who were strongly influenced by it originally. Because what a lot of people think it said when they first read it tends to look a lot different in today's perspective.

This person might also point out that what I said is in many cases not as important as when I said it; that I was

firmly pointing to the personal computer and personal software industry long before most people conceived of the possibility; and that my predictions of hypertext may well occur just as I have been saying. Also that the system I've been designing and writing about all these years is now commercially available to well-to-do corporations wanting to put together their product line for the mid-eighties.

I would also like it if this person would compare me to Bucky Fuller and Marshall McLuhan, for originality, scope, and probable long-term effects on everybody's thinking. Or to Tesla for far-sightedness, clear-mindedness and (oh well) arrogance. Or to Orwell for simply looking at things without preconceptions and with a certain perceptive cynicism, and seeing very clearly where things would go in the future-- both due to herd instinct and villainy.

If anyone should find such a preface lying around, I'll be glad to paste it in here.

Theodor Holm Nelson
San Antonio, Texas

November 1983

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The computer is the most misunderstood and misrepresented entity on land or sea.

("Barnum-Tronics," 1970, p. 13)

The computer is a magical detail man, capable of carrying out almost anything you can reduce to an orderly process.

("Barnum-Tronics," 1970, p. 13)

Knowledge, understanding and freedom can all be advanced by the promotion and deployment of computer display consoles (with the right programs behind them).

("Barnum-Tronics," 1970, p. 13-14)

Computer presentational media, coming soon, will not be technically determined but rather will be new realms for human artistry. This point of view radically affects how we design man-machine systems of any kind, especially those for information retrieval, teaching, and general reading and writing. Some practitioners see such systems as narrowly technical, with the computer hoisting up little pieces of writing on some "scientific" basis and showing them to you one grunt at a time. A Metrecal banquet. I disagree. The systems should be opulent.

("Barnum-Tronics," 1970, p. 14)

The problem in presentational systems of any kind is to

make things look good, feel right, and come across clearly. The things that matter are the feel of the system, the user's state of mind, his possible confusion, boredom or enthusiasm, the problems of communicating concepts, and the very nature of concepts and their interconnection. There will never be a "science" of presentation, except as it relates to these things.

("Barnum-Tronics," 1970, p. 14)

Not the nature of machines, but the nature of ideas, is what matters. It is incredibly hard to develop, organize and transmit ideas, and it always will be. But at least in the future we won't be booby-trapped by the nature of paper. We can design magic paper.

("Barnum-Tronics," 1970, p. 14)

All I want to do is put Renaissance humanism in a multidimensional responsive console.

("Barnum-Tronics," 1970, p. 14)

Hypertexts will be so much better than ordinary writing that the printed word will wither away. Real writing by people, make no mistake, not data banks, robot summaries or other clank. A person is writing to other people, just as before, but on magical paper he can cut up and tie in knots and fly around on.

("Barnum-Tronics," 1970, p. 14)

I think of Xanadu as the fundamental text system of the future, the magic carpet of the mind. The basic idea is that the computer should be able to hold your writings and thoughts in at least the complexity they have in your mind (unlike paper, where thoughts must be truncated and parodied), with every cross-link and annotation you want to put in. Through all this you may zoom like a bird in an enchanted forest. The system will help you ponder complex theories and compare variations of what you're studying or creating; it should also allow you to go back in time through earlier versions of your work, perhaps building again on drafts you thought you had discarded. You can sift and combine your notes into a conventional work or leave it all hanging in a huge controlled agglomeration. The system will help integrate syntheses, unravel inspirations, deconfuse thought. But, of course, you may read and write hypertexts. Every kind of human creativity-- not just writing-- can be aided if we build a sufficiently general creativity console, such as Xanadu.

("Barnum-Tronics," 1970, p. 15)

So far my predictions have been generally right except for chronology. I originally thought the printed word might be eliminated by 1970 or 1972. Now, uh, I guess it will take a little longer. ("Is Nelson paranoid?" asks a recent letter to Computer Decisions magazine.) But it's going to

happen. Computer screens will be in the home, perhaps sooner than in the school. No more graveyards of paper for the words we write. No more pencils, no more books, no more teachers' dirty looks.

("Barnum-Tronics," 1970, p. 15)

Ladies and gentlemen, the age of prestidigitative presentation and publishing is about to begin. Palpitating presentations, screen-scribbled, will dance to your desire, making manifest the many mysteries of winding wisdom. But if we are to rehumanize an increasingly brutal and disagreeable world, we must step up our efforts. And we must hurry. Hurry. Step right up.

("Barnum-Tronics," 1970, p. 15)

Despite changing economies, it is fashionably believed that computers are possessed only by huge organizations to be used only for vast corporate tasks or intricate scientific calculations. As long as people think that, machines will be brutes and not friends, bureaucrats and not helpmeets. But since (as I will indicate), computers could do the dirty work of personal file and text handling, and do it with richness and subtlety beyond anything we know, there ought to be a sense of need.

("A File Structure for the Complex, the Changing and the Indeterminate," 1965, p. 85)

The hardware is ready. Standard computers can handle huge bodies of written information, storing them on magnetic recording media and displaying their contents on CRT consoles, which far outshine desktop projectors. But no programs, no file software are standing ready to do the intricate filing job (keeping track of associate trails and other structures) that the active scientist or thinker wants or needs.

("A File Structure for the Complex, the Changing and the Indeterminate," 1965, p. 86)

If a writer is really to be helped by an automated system, it ought to do more than retype and transpose: it should stand by him during the early periods of muddled confusion, when his ideas are scraps, fragments, phrases, and contradictory overall designs. And it must help him through to the final draft with every feasible mechanical aid-- making the fragments easy to find, and making easier the tentative sequencing and juxtaposing and comparing.

("A File Structure for the Complex, the Changing and the Indeterminate," 1965, p. 85)

As computer-based systems grow in capability and diversity of use, they tend to become more and more

cluttered with niggling complications, hidden passageways, and lurking, detailed interlocks, restrictions, specializations, provisos. These should be forsworn, if possible, in the system under discussion, so that it might be attractive to laymen (including artists and writers) who feel unkindly disposed toward computers. It should readily adapt to their own styles of handling things, imposing few conventions or methods of use.

("A File Structure for the Complex, the Changing and the Indeterminate," 1965, p. 85)

Let me introduce the word "hypertext" to mean a body of written or pictorial material interconnected in such a complex way that it could not conveniently be presented or represented on paper. It may contain summaries, or maps of its contents and their interrelations; it may contain annotations, additions and footnotes from scholars who have examined it. Let me suggest that such an object and system, properly designed and administered, could have great potential for education, increasing the student's range of choices, his sense of freedom, his motivation, and his intellectual grasp. Such a system could grow indefinitely, gradually including more and more of the world's written knowledge. However, its internal file structure would have to be built to accept growth, change and complex informational arrangements.

("A File Structure for the Complex, the Changing and the Indeterminate," 1965, p. 96)

Films, sound recordings, and video recordings are also linear strings, basically for mechanical reasons. But these, too, can now be arranged as non-linear systems-- for instance, lattices-- for editing purposes, or for display with different emphasis. (This would naturally require computer control, using the ELF or a related system, and various cartridges or re-recording devices.) The hyperfilm-- a browsable or vari-sequenced movie-- is only one of the possible hypermedia that require our attention.

("A File Structure for the Complex, the Changing and the Indeterminate," 1965, p. 96)

The physical universe is not all that decays. So do abstractions and categories.

("A File Structure for the Complex, the Changing and the Indeterminate," 1965, p. 96)

While the disappearance and up-ending of categories and subjects may be erratic, it never stops; and the meaning of this for information retrieval should be clear. Last week's categories, perhaps last night's field, may be gone today.

To the extent that information retrieval is concerned with seeking true or ideal or permanent codes and categories-- and even the most sophisticated "role indicator" syntaxes are a form of this endeavor-- to this extent, information retrieval seems to me to be fundamentally mistaken.

("A File Structure for the Complex, the Changing and the Indeterminate," 1965, p. 97)

There is, then, a general rationale. I believe that such a system as the ELF actually ties in better than anything previously used with the actual processes by which thought is progressively organized, whether into stories or hypertext or library categories. Thus it may help integrate, for human understanding, bodies of material so diversely connected that they could not be untangled by the unaided mind. For both logistic and psychological reasons it should be an important adjunct to imaginative, integrating and creative enterprises. It is useful where relationships are unclear; where contingencies and tasks are undefined and unpredictable; where the structures or final outcome it must represent are not yet fully known; where we do not know the file's ultimate arrangement; where we do not know what parts of the file are most important; or where things are in permanent and unpredictable flux. Perhaps this includes more places than we think. And perhaps here, as in biology, the only ultimate structure is change itself.

("A File Structure for the Complex, the Changing and the Indeterminate," 1965, p. 97)

What we regard as knowledge includes various contradictory sets of interwoven propositions, clusters of argument, and discrepancies of faith, taste and emphasis in the literature. There is usually disagreement in every field of knowledge. This means that in a queriable information network, different and mutually contradictory theories really ought to be able to coexist within the system.

("Getting It Out of Our System," 1967, p. 194.)

Systems thinkers have proposed a greate variety of possible arrangements for ordering man's thoughts and aiding his mind with the computer. I would like to propose that this diversity of possible facilities and functions is in fact comprisable into an organized text medium, to be created and used by people and for people.

("Getting It Out of Our System," 1967, p. 195.)

Hypertext will be a medium, not a facility, and the institutions of authorship, citation, academic commentary and argument will be preserved and incorporated in an orderly fashion.

("Getting It Out of Our System," 1967,
pp. 195-6.)

The reader will explore, light pen in hand, browsing or studying closely, choosing paths he prefers, criss-crossing these paths on summary levels, stepping from section to section and stopping for deeper work in units of interest. He will come to understand the whole, or a general section, like a walker exploring a city.

("Getting It Out of Our System," 1967,
p. 194.)

It may be complained that we should eliminate the vagaries and biases that individuals composing hypertexts will introduce. To this I would reply that vagaries and biases which are signed by individuals, and for which they are responsible, are far preferable to those that are silently designed right into the system's heart.

("Getting It Out of Our System," 1967,
p. 200.)

The prior techniques of the theater were at first extended to movies, and it was several decades before we understood the motion picture as a medium. It was as natural to extrapolate these prior techniques to the movie as it now seems natural to extrapolate prior techniques of information handling to the CRT-computer-mass memory system. Here

again, as in films, the technology makes possible a medium which is radically new and has dynamics of its own. The most suitable techniques and units were not immediately evident in movies, either.

("Getting It Out of Our System," 1967,
p. 208.)

The conventional "document" is not God-given, and in fact is inappropriate for most purposes. Systems based on discrete and isolated documents relinquish the greatest power of the new technology. But at the other extreme we are wrong to suppose that an information machine can or should eliminate the human task of composition. We have not begun to explore the possibilities of natural language woven into more complex (but also natural) arrangements.

The problem of Getting It Out of Our System, then, is not the problem of fishhook design for a document pool, or of creating a conversational black box with a narrow vocabulary. We must get out of our system the fixities of thinking and procedure that hold us back.

("Getting It Out of Our System," 1967,
pp. 207-8)

The truth is that I am not really trying to interest computer people. They are the ones who only seem to tell me, "It can't be done." There turns out to be no answer to

that. Many times I have come up with a way to do something, in which case the man who said it couldn't be done usually says, "Why would you want to do such a thing, anywa?"

It is the laymen and literati, the noncomputer people, I want to reach. But this also seems futile. A few laymen and literati occasionally seem to become quite turned on, but without Experts to confirm what I say is possible, they gradually edge away and don't listen either. I feel like Marco Polo in his later years, no longer Italian and certainly not Chinese, trying to interest one in the other.

("Computopia and Cybercrud", 1970, p.
185.)

We are usually told, on various sides, that some kind of revolution of human information is upon us, but somehow in the course of things the computer will make this revolution inhuman. Chugga-chugga, we will have to learn obtuse query languages. Rattle-clank, we will get answers back in symbolic logic. (Too bad for some of us.) Tippity-tap, the terminal will tell us a thing and then ask us what it told us. Tell and test, tell and test, instant boredom, but who dares argue with science?

("Computopia and Cybercrud," 1971, p.
186.)

The horizons I am talking about lie a little further.

Within the coming decade we will see the explosive growth of computer display, an expansion that will rival or surpass that of television, and compare in ubiquity to the very telephone. We are going to have an entire cultural revolution based on computer display.

It is my belief that many important benefits can flow from this revolution, if we do it right. I believe enlightenment, knowledge, and understanding can be furthered throughout the public. I believe creativity can be fostered in many of its forms. And I believe a new and important freedom of information is possible.

This is my prediction and my call to battle; evidently few of the most ardent enthusiasts of computer display go so far. But if it is correct, it means a revolution in human life and thought comparable to what followed Gutenberg. My interest is in giving shape to that revolution, in urging it toward enlightenment and humanist freedoms, rather than having it stumble accidentally into the formalization of dreariness.

("Computopia and Cybercrud," 1971, pp.
186-7.)

What will these screens be for? And what will be on them? Many people seem to be in the grip of the travel-agent idea-- that screen terminals will be for bank clerks and airline reservation people. Sure, for a while. But they are also going to be in the home. (And if we have

them in the home, they may not be needed by travel agents.)

("Computopia and Cybercrud," 1971, p.
187.)

I want a world where we can read the world's literature from screens rather than personally searching out the physical books. A world without routine paperwork, because all copying operations take place automatically and formalized transactions occur through formalized ceremonies at consoles. A world where we can learn, study, create and share our creations without having privately to schlepp and physically safeguard them. There is a familiar, all-embracing motto, the jingle we all know from the day school lets out, which I take quite seriously: "No more pencils, no more books; no more teachers' dirty looks." The Fantic Age.

("Computopia and Cybercrud," 1971, p.
187.)

In dark contrast to such a possible enlightenment, I would like to point out an unfortunate tendency, occasionally a villainous practice, which we may call cybercrud. By cybercrud I mean putting things over on people using computers.

Cybercrud can take many forms, all related. The computer's cachet may be used to hide your premises, the way you want to do things, the secret loadings of your approach

and procedures. The computer, its accessories, and terminology, can give the semblance of validity to all sorts of procedures or statistics. The term "computer" is to many a rubber stamp meaning "scientific."

We may use the computer, or the mention of it, to perplex, intimidate or bamboozle. This, too, is cybercrud.

("Computopia and Cybercrud," 1971, p. 188.)

That school is stupid, boring, and insulting need scarcely be mentioned, except that we tend to forget it. We forget the inanity, the complete nonsensicality of most grade school and high school pursuits. Their insignia of officiality somehow seems to make them right. What matter if children's good time is being wasted by astrology, candle-dipping, or Euclidean derivations? Any nonsense will do, so long as it leaves a trail of grades, evaluations etched in history that can be used to blackmail the victims or their parents.

Curricular timing and grading virtually obliterate the nature and natural interest of every subject. It is as though we were taken in groups to visit national parks in the back of a truck, racing on a treadmill. Every possible activity is related to a made-up standard, nothing is allowed to be merely interesting. For those on the up side, the system furnishes clues as to direction of reward; for those on the down side, the presumption of own failure is

affixed to the subject. Few of us do not learn that we are "no good" at something, and adult regrets are heavy with both the realization that it could have been different and self-blame that it was not.

Some remarkable traditions govern the structuring of subjects as we teach them. But they are no more in the nature of the things to be learned than the cuts of steak are in the anatomy. Every subject has a beginning, a middle, and an end; it is laid out by the assigned reading and precisely bounded by the scope of the final exam; every topic may be reduced to shallow enumerations trung on vague explanatory connections, dismally explained inanities, explanations which associate phraes without a sense of meaning, and incompletely explained "skills" to be practiced without insight. Questions and other mattes therefore become either "relevant" or "not relevant," according to whether they fit the boundaries and sequence of the "subject." And thus it can come about that the answer to a question is, "Just learn what you're told."

We have been misled into believing that all this is how it has to be: the cascade of premises flows into a landlocked swamp.

("Computopia and Cybercrud," 1971, p.
189.)

We suppose that because some learning sequences cannot be circumvented, then all learning should be reduced to

sequences. This has several disastrous consequences.

First, unique curricular paths. The curricula of the schools are generally designed as pathways radiating from some primal state of ignorance, wagon-wheel spokes without the wheel. The only way to learn most things in school is by taking an exactly prescribed series of intermediate steps. There is no way around. And if one has not taken the steps between, a thing simply cannot be learned.

The psychological consequence is most pernicious. There are things one "knows" (if the details are forgotten, one is still oriented) and things one "does not know" (there has been no introduction, no orientation). A sense of weakness is produced; one drops a subject that has come up; one shrugs. But this is only part of it. What is much worse is that when one has "failed" in a subject, all further thoughts about this subject are darkened, colored by this sense of failure. One avoids; one strives actively to find other interests or distractions: "Aw, never mind that stuff."

Last, the sociological consequence. We produce people with funneled minds, the so-called "types"-- the literary type, the scientific type, the mathematical gype. And an occupational structure around these types. And subcultural divisions. And everybody stays where he feels safe, and everything interesting in the world is hidden from almost everybody.

("Computopia and Cybercrud," 1971, p.

186.)

Imagine (if you can) people growing up without a self-stereotype of structured disabilities, who thought they could do anything if they worked at it. Imagine most people having a real choice of occupations. Imagine if the classroom atmosphere could be stripped away and the students put in genuine rapt communication with the subject-- a state which teachers are sometimes deluded into thinking they achieve-- without the deleterious effects of competition, time pressure, and stigmata for real participants. Imagine kids experiencing the excitement of intellectual issues-- and not just as a fleeting part of that grim academic exercise, writing a paper. Imagine students actually interested in school. Or whatever we would now have to call it.

("Computopia and Cybercrud," 1971, p.
190.)

We have many media now: the newspaper, the movie, the phonograph record, the TV show, and many more, each with its own variations. We understand these media and the people who do things in them; we understand the position of the reporter and the columnist, the photo-journalist and the movie director, and their contributions in bringing us facts, impressions, and visions.

Yet for some reason we have failed to extend this

understanding to the media that will be brought to us by the computer. There is a floating myth that computer media will be different from all those that have gone before, either thrown together on the fly by the machine itself, or presenting passive nonedited descriptions of the world, or dutifully constructed on scientific principles by psychologists who remain aloof from the content. I find all of these ideas rather absurd, especially since to formulate them we ignore our extensive experience with other media.

("Computopia and Cybercrud," 1971, p.
191.)

I think none of these models represents the main thing that will happen. Rather, people will be designing display-based media and creating works in these media. Indeed, people will be signing them, just as ever before, and viewers will seek out the works of particular authors much as we now do in every other medium.

("Computopia and Cybercrud," 1971, p.
191.)

To supply our scopes with the hypermedia we will want to read, I foresee a new era of publishing, and a whole new publishing industry. In this coming era the digital files of the publisher will be connected by telephone (or other means) to the subscriber's console. As you ramble through

hypertexts or explore hypergrams, the news of your actions will be flashed to the great feeder machines at the publishers' distribution centers. These feeder machines will disgorge to the customer the furtherances of what he is doing, keeping him continuously supplied. The material will be copyrighted, and small royalties will be continuously billed for screen-minutes of presentation. Entirely new creations and the works of the past will be equally and quickly available. Enchanted gardens of information, prearranged by authors and editors, will be available to you. Screen pyrotechnics and display tricks will be intertwined with pictures and text. There will be anthologies, magazines, encyclopedias-- or things like them.

("Computopia and Cybercrud," 1971, p.
192.)

If we are to move toward anyone's computopia, or even the simpler goal of a more human and humane world in which computers are prominent, what experts call technically necessary will have to come under close public scrutiny.

Doubletalk and silly press releases have done their damage. The public has been told what experts think the computer should do to them; now the public is down on computers and, by these lights, rightly. It is time for a new accommodation.

And we who have known enough to do so will have to stop fooling the public. To insiders, the ocomputer is not just a

tool, but a costume we wear when we want to further our own ways of doing things, much as Bugs Bunny masquerades as a tiptoeing tree-trunk.

("Computopia and Cybercrud," 1971, p. 198.)

A sense of awe is essential to work in this area. If there is a failure of awe, you do not understand computer display.

And perhaps that says something about education. For awe and understanding to occur at the same moment is perhaps the pinnacle of the human experience. It is certainly the most important moment of education, if it ever occurs. The two sides of the mind, feeling and insight, are no more separate than the two sides of a coin. Both must be served. Both must act together. How the person feels at the console largely determines what he will learn for good.

I believe one university built in the thirties had a skyscraper called the Cathedral of Learning. That doesn't put it badly. If a cathedral is a place of awe and communion, then our new cathedrals of learning will be our presenting and responding consoles. The architecture of these consoles, and the crafting of their responsiveness and their virtual spaces, is a worthy task.

("Computopia and Cybercrud," 1971, p. 198.)

Any nitwit can understand computers, and many do.

(Computer Lib, 1974, p. 2.)

Computers are simply a necessary and enjoyable part of life, like food and books. Computers are not everything, but they are an aspect of everything, and not to know this is computer illiteracy, a silly and dangerous ignorance.

(Computer Lib, 1974, p. 2.)

Man has created the myth of "the computer" in his own image, or one of them: cold, immaculate, sterile, "scientific," oppressive.

Some people flee this image. Others, drawn toward it, have joined the cold-sterile-oppressive cult, and propagate it like a faith. Many are still about this mischief, making people do things rigidly and saying it is the computer's fault.

Still others see computers for what they really are: versatile gizmos which may be turned to any purpose, in any style. And so a wealth of new styles and human purposes are being proposed and tried, each proponent propounding his own dream in his own very personal way.

(Computer Lib, 1974, p. 2.)

Knowledge is power and so it tends to be hoarded. Experts in any field rarely want people to understand what they do and generally enjoy putting people down.

Thus if we say that the user of computers is dominated by a priesthood, people who spatter you with unintelligible answers and seem unwilling to give you straight ones, it is not that they are different in this respect from any other profession. Doctors, lawyers and construction engineers are the same way.

But computers are very special, and we have to deal with them everywhere, and this effectively gives the computer priesthood a stranglehold on the operation of all large organizations, of government bureaux, and anything else that they run. Members of Congress are now complaining about control of information by the computer people, that they cannot get the information even though it's on computers. Next to this it seems a small matter that in ordinary companies "untrained" personnel can't get straight questions answered by computer people, but it's the same phenomenon.

(Computer Lib, 1974, p. 2.)

A generation of computer fans and hobbyists is well on its way, but for the most part these are people who have had some sort of an In. This is meant to be an In for those who

didn't get one earlier.

The computer fan is someone who appreciates the options, fun, excitement, and fiendish fascination of computers. Not only is the computer fun in itself, like electric trains; but it also extends to you a wide variety of possible personal uses.

(Computer Lib, 1974, p. 3.)

Somehow the idea is abroad that computer activities are uncreative, as compared, say, with rotating clay against your fingers until it becomes a pot. This is categorically false. Computers involve imagination and creation at the highest level. Computers are an involvement you can really get into, regardless of your trip or your karma. They are toys, they are tools, they are glorious abstractions. So if you like mental creation, toy trains, or abstractions, computers are for you. If you are interested in democracy and its future, you'd better understand computers. And if you are concerned about power and the way it is being used, and aren't we all right now, the same thing goes.

(Computer Lib, 1974, p. 3.)

A chant you can take to the streets:

COMPUTER POWER TO THE PEOPLE!

DOWN WITH CYBERCRUD!

(Computer Lib, 1974, p. 3.)

The uninformed are bulldozed, and even the informed are pressured, by the foolish myths of the clever, implacable and scientific computer to which they must adapt. People are told they have to "relate to the computer." But actually they are being made to relate to systems humans have designed around it, in much the same way a sword dance is designed around the sword.

When establishment computer people say that the computer requires you to be systematic, they generally mean you have to learn their system. But anyone who tells you a method "has to be changed for the computer" is usually fibbing. He prefers to change the method for the computer. The reasons may be bad or good. Often the computer salesman or indoctrinator will present as "scientific" techniques which were doped out or whomped up by a couple of guys in the back room.

(Computer Lib, 1974, p. 8.)

In over a decade in the field I have not ceased to marvel at the way people's personalities entwine with the computer, each making it his own-- or rejecting it-- in his own, often unique and peculiar way, deeply reflecting his concerns and what is in his heart. Yes, odd people are attracted to the computer, and the bonds that hold them are not those of

casual interest.

In fact, people tend to identify with it.

(Computer Lib, 1974, p. 9.)

It's awfully easy to fool people with simple words, let alone buffalo them with weird technical-sounding gab. The thing about tech talk is that it can really be applied to any area. The trick lies in the arrangement of boxcar adjective nouns, and in the vague use of windy terms that have connotations in some particular technical area-- say, the space program.

Just consider. We could call a spade--

A PERSONALIZED EARTH-MOVING EQUIPMENT MODULE

A MINERALOGICAL MINI-TRANSPORT

A PERSONALIZED STRATEGIC TELLURIAN COMMAND AND CONTROL
MODULE

AN AIR-TO-GROUND INTERFACE CONTOUR ADJUSTMENT PROBE

A LEVERAGED TACTILE-FEEDBACK GEOMASS DELIVERY SYSTEM

A MAN-MACHINE ENERGY-TO-STRUCTURE CONVERTER

A ONE-TO-ONE INDIVIDUALIZED GEOPHYSICAL RESTRUCTURIZER

A PORTABLE UNITIZED EARTHWORK SYNTHESIS SYSTEM

AN ENTRENCHING TOOL (Firesign Theater)

A ZERO-SUM DIRT LEVEL ADJUSTER

A FEEDBACK-ORIENTED CONTOUR MANAGEMENT PROBE AND
DIGGING SYSTEM

A GRADIENT DISEQUILIBRATOR

A MASS DISTRIBUTION NEGENTROPRIZER

Hey!

A DIG-IT-ALL SYSTEM

or

AN EXTRA TERRESTRIAL TRANSPORT MECHANISM.

Spades, not words, should be used for shovelling. But words should help us unearth the truth.

(Computer Lib, 1974, p. 12.)

One of the commonest and most destructive myths about computers is the idea that they "only deal with numbers." This is TOTALLY FALSE. Not only is it a ghastly misunderstanding, but it is often an intentional misrepresentation, and as such, not only is it a misrepresentation but it is a damned lie, and anyone who tells it is using "mathematics" as a wet noodle to beat the reader with.

Computers deal with symbols and patterns.

(Computer Lib, 1974, p. 26.)

"ASCII and ye shall receive."-- The Industry

"ASCII not, what your computer will do for you." -- IBM

(Computer Lib, 1974, p. 28.)

A register is a place where something happens to information.

...

A memory is a place where nothing happens to information.

(Computer Lib, 1974, p. 32.)

Computer people are a mystery to others, who see them as somewhat frightening, somewhat ridiculous. Their concerns seem so peculiar, their hours so bizarre, their language so incomprehensible.

Computer people may best be thought of as a new ethnic group, very much unto themselves.

(Computer Lib, 1974, p. 46.)

This paper is not about everything between man and machine, but about man-machine everything, that is, the desirable future condition where most of our information and tasks are attractively and comprehensively united through nice man-mechanisms. The breadth of possibilities is mind-boggling. But that they are possibilities for the choosing, rather than eventualities to be engineered, does not seem to be clear to people yet.

("A Conceptual Framework for Man-Machine Everything, 1973?; manuscript p. 2.)

Everything is deeply intertwined.

(Computer Lib/Dream Machines, 1974,
passim.)

Using a computer should always be easier than not using a
computer.

(Computer Lib/Dream Machines, 1974, page
not found.)

If the computer is a projective system, or Rorschach
inkblot, as alleged on the other side, the real projective
systems-- the ones with projectors in them-- are all the
more so. The things people try to do with movies, TV and
the more glamorous uses of the computer, whereby it makes
pictures on screens-- are strange inversions and foldovers
of the rest of the mind and heart. That's the peculiar
origami of the self.

(Dream Machines [Side 2 of Computer
Lib], 1974, p. DM2)

My special concern, all too tightly framed here, is the
use of computers to help people write, think and show. But
I think presentation by computer is a branch of show biz and

writing, not of psychology, engineering or pedagogy. This would be idle disputation if it did not have far-reaching consequences for the designs of the systems we are all going to have to live with. At worst, I fear these may lock us in; at best, I hope they can further the individualistic traditions of literature, film and scholarship. But we must create our brave new worlds with art, zest, intelligence, and the highest possible ideals.

I have not mentioned the emotions. Movies and books, music and even architecture have for all of us been part of important emotional moments. The same is going to happen with the new media. To work at a highly responsive computer display screen, for instance, can be deeply exciting, like flying an airplane through a canyon, or talking to somebody brilliant. This is as it should be. ("The reason is, and by rights ought to be, slave to the emotions." -- Bertrand Russell.)

In the design of our future media and systems, we should not shrink from this emotional aspect as a legitimate part of our fantic design. The substratum of technicalities, and the mind-bending, gut-slamming effects they produce, are two sides of the same coin; and to understand the one is not necessarily to be alienated from the other.

Thus it is for the Wholiness of the human spirit, that we must design.

LibJ, 1974, p. DM2)

Having spent some considerable time around and among these areas, I have developed considerable cynicism and a bad case of the giggles. Originally it all seemed to fit together and to be leading somewhere, but talking to people at all levels, and either giving advice or trying to interpret the advice of others, I am convinced that what we have here in this whole audio-visual-presentational whizbang field is nothing less than a very high order of collective insanity. The strange way companies adopt and drop various product lines, and verbalize what they think they are doing, seem to me a combination of lemmingism and a willingness to follow any Authority in an expensive suit. I have talked to enough vice-presidents and presidents of computer companies, networks, media outfits and so on, to be totally certain that they have no special knowledge or unusual basis of information; yet these people's remarks, as amplified through the business reporters, send the whole nation a-dithering. There are times I think everyone in Media is either deluded, misguided, lying or crazy.

(Dream Machines [Side 2 of Computer
LibJ, 1974, p. DM4.)

If computers are the wave of the future, displays are the surfboards.

(Dream Machines [Side 2 of Computer Lib], 1974, p. DM22)

My work is concerned principally with the theory and execution of systems useful to the mind and the creative imagination. This has polemical and practical aspects: I claim that the precepts of designing systems that touch people's minds, or contents to be shown in them, are simple and universal: making things look good, feel right, and come across clearly. I claim that to design systems that involve both machines and people's minds is art first, technology second, and in no way a derivative specialty off in some branch of computer science.

However, presentational systems will certainly involve computers from now on.

(Dream Machines [Side 2 of Computer Lib], 1974, p. DM58.)

To me, you see, this is really a holy crusade, whereas I know guys to whom it's just a living. It's no less than a question of freedom in our time. The cases of Solzhenitsyn and Ellsberg remind us that freedom is still not what it should be, anywhere. Computer display and storage can bring us a whole new literature, the uniting and the apotheosis of the old and the new, but there are many who would not

necessarily want to see this come about. Deep and widespread computer systems would be tempting to two dangerous parties, "organized crime" and the Executive branch of the Federal government (assuming there is still a difference between the two). If we are to have the freedoms of information we deserve as a free people, the safeguards have to be built in at the bottom, now. And the opulence which is possible must be made clear to everyone before we settle on an inferior system-- as we did with television.

(Dream Machines [Side 2 of Computer Lib], 1974, p. DM59.)

Some people have called my ideas and systems "Orwellian." This is annoying in two ways. In the first place it suggests the nightmare of Orwell's book Nineteen Eighty-Four, which obviously I want no part of. (But hey, do you remember what that world of 1984 was actually like? The cryptic wars against unseen enemies that kept shifting? The government spying? The use of language to twist and manipulate? To paraphrase Huey Long: "Of course we'll have 1984 in America. Only we'll call it 1972.")

The second reason the term "Orwellian" is offensive is that it somehow reduces the life of Orwell, the man, to the world of "1984." This is a shallow and shabby thing to do to a man who spent his life unmasking oppressiveness in human institutions everywhere.

In the larger sense, then-- in homage to that simple, honest, angry man, who cared about nothing more than human freedom-- I would be proud indeed if my systems could be called Orwellian.

(Dream Machines [Side 2 of Computer Lib], 1974, p. DM59.)

By Computer Lib I mean simply: making people freer through computers. That's all.

(Dream Machines [Side 2 of Computer Lib], 1974, p. DM59.)

Computers do what people want them to do, at best. Figuring out what we should want, in full contemplation of the outspread possibilities, is a task that needs us all, laymen no less.

("A Conceptual Framework for Man-Machine Everything, 1973?; manuscript p. 2.)

Various "professional" approaches to our on-line future have confused us and left us stumbling around. I refer particularly to (a) the field of "computer-assisted instruction," where a computer is often programmed to act like a crabby schoolmarm, coercively leading students around by the nose and chiding them personally; and (b) the field of "information retrieval," where a computer is often

programmed to act like a wind-up librarian, sorting new questions into obsolete categories.

("A Conceptual Framework for Man-Machine Everything, 1973?; manuscript p. 3.)

Computer fans agree that the home computer is on the way. Soon a minicomputer can be put on a few integrated circuits, and the price will be right-- perhaps a thousand dollars retail before discount pricing. But the question of how we will use it, and thus how it will be marketed, stalls such an enterprise.

("A Conceptual Framework for Man-Machine Everything, 1973?; manuscript p. 4.)

Now, various combinations have been suggested for media of the future, from branching video cassettes to (almost) holograms with dial-up audio. But it seems obvious that when things get sorted out there will be a resolution to fewer things. Just as movie-makers usually do not mix-and-match different forms of output, but stick with sound-on-film 35mm, certain combinations in the grand computer-audio-visual realm will surely predominate. The question is where to cut and combine, what not to bother with, and pre-eminently, what will Catch On. Video is oversold, digital media little known. But I think when the smoke clears our main new medium of the future will be the branching, performing, digital text-and-picture package.

Coming over the phone (or other) line to the home system, in pieces summoned by a chain of user choices, it will be almanac, encyclopedia, novel and comic book, playground and travelog and time machine. The Home System will thus be both a Fun System and a Work System.

("A Conceptual Framework for Man-Machine Everything, 1973?; manuscript p. 5.)

We all agree that one way or another, a heyday of computer graphics is coming, and that uninitiated users-- let us call them "simple users," as they may not necessarily be naive-- will use them. But it seems to be supposed by many that the simple user of graphic systems will still have the same psychological environment of today's computer user: he will "call programs" and employ "terminal languages," or at best make selections from uniform-looking columnar menus. In other words, there will still be explicit user-invoked transactions and transitions among data and programs. A little thought may reveal that this is neither desirable nor necessary. We want to be able to roam across boundaries, to call things from one place into the windows of another. Thus tomorrow's sensible graphic systems should permit merged graphic composites-- two-dimensional tapestries or three-dimensional scenes that may be selected and blended from among available graphical and program structures, and roamed over freely by the user.

This suggests that a pre-literate child, for instance,

could guide his display screen down a carnival midway with a joystick, turn to watch a cartoon " juggler " do tricks with numbers, and then, if interested, guide his screen through an entrance into a " circus tent " where the number tricks continue. Or an adult, roving on his screen through explorable views of Stonehenge, may branch from twinkling screen-markers to the many theories about it, and thence to the books and articles expressing these theories-- all the while he still explores, and searches out relevant angles in, the three-dimensional model of Stonehenge still on part of the screen.

("A Conceptual Framework for Man-Machine
Everything, 1973?; manuscript pp.
10-11.)

If we call a graphic environment and its rules a "screenworld"-- whether a tapestry of drawn data or a set of simulation programs-- then this many-ported visual (and calling) access between them creates interpenetrating screenworlds. The advantages of such explorable graphic mosaics should be obvious: roaming over them will be like perusing the Sunday comics (or Ray Bradbury's Illustrated Man), without getting lost, while we remain always in a vividly comprehensible setting. I expect that editorially we will be laying out such tapestries and scenes like magazine spreads.

The question is, what does the human mind want? Given

the possibilities of digital exploration, what systems will be best for scholarship, learning, creativity and fun (all closely related)? What are the cleverest and best unifications? We have yet to find out these answers. But to suppose the desirable systems resemble "instruction" or library searches is hugely premature.

("A Conceptual Framework for Man-Machine Everything, 1973?; manuscript pp. 12-13.)

Hyper-media are essentially prearranged presentations without fixed sequence: animated, branching world-and-picture bundles. These include branching and performing graphics, as already mentioned, and branching or performing text, or hypertext.

("A Conceptual Framework for Man-Machine Everything, 1973?; manuscript p. 13.)

When authors and editors are given the ability to create such discrete jump-links, the character of writing should change dramatically. The potential strength of such new forms of writing can only be surmised at this point, but it should be considerable.

("A Conceptual Framework for Man-Machine Everything, 1973?; manuscript p. 14.)

Conjecture 1: we've been speaking hypertext all our lives and never known it. The Tinkertoy structure of thought is inherently parallel, but must be conveyed on the linear conveyor belt of speech. Cross-citing the connections, by intonation, self-interruption, pushes, pops and cross-reference, has always been a day-to-day problem.

Conjecture 2: there has been pressure toward hypertext since the written word began; consider the footnote. Hypertext is immanent in any attempt to put text into man-machine systems, and is certain to emerge no matter where we begin.

Conjecture 3: the interconnective structure of hypertexts will gravitate toward the real structure of the thoughts expressed.

Conjecture 4: understanding of complex relations will come to the hypertext reader through traversal in different directions-- like learning your way around some complicated piece of architecture.

Conjecture 5: hypertext will be easier to write. This is because rather than deciding among expository and transitional structures, the writer may use them all.

("A Conceptual Framework for Man-Machine Everything, 1973?; manuscript p. 15.)

By the psychic architecture of a system, I mean the mental conceptions and space structures among which the user

moves; their arrangements and their qualities, especially clarity, integration and meshing, power, utility and lack of clutter. It should be noted that these notions are much like those by which we judge regular architecture, and indeed the relationship would seem very close. An architectural grand design-- say, of a capitol building-- embraces the fundamental concepts a user will have to know to get around: main places, corridor arrangements (visualization and symmetries), access structure. These concepts are the very same in a screenworld or other complex man-made virtual structure: main places, corridors or transition rules (and their visualization and symmetries), access structure. It is a virtual space much like a building, (though not confined to three "normally" connected dimensions), and susceptible to the same modes of spatial understanding, kinds of possible movement within, and potential appreciation and criticism.

The orientation problem is in both cases-- real building and screenworld-- immensely important. Because there is no "natural" structure to fantic space (see below), as there is in our 3D world, great care must be given to maintaining the user's clarity of mind. Especially for this reason, the fantic space should have a Grand Design-- an overall shape easy to remember and visualize in some way. I think that there is art to it, that it is not all "human factors" and reinforcement schedules.

("A Conceptual Framework for Man-Machine

Everything, 1973?; manuscript p. 18-19.)

Thus fantics. Computer graphics will be its principal mechanism, but not its center. Its center is the communication of ideas and thoughts, whether they be facts, poems, or body gestures translated electronically to complex happenings on another planet. Inventing the best presentational media from among the remarkable options now requires our close attention.

("A Conceptual Framework for Man-Machine
Everything, 1973?; manuscript p. 20.)

By "fantic unification," I mean tying things together in a central presentational or control structure which unites them conceptually. Example: several wing-flaps of an airplane are united in its control yoke, a crescent on a rod which may be both turned and moved forward and back. The airplane's flaps do not individually correspond to a desired effect, nor do the combined movements of the control, necessarily; yet this integration provides a convenient unified "feel" to the pilot.

It is in much the same way that we unify things in all presentational modalities-- in writing, in diagrams, in movies or whatever-- creating structures, organizing principles or unifications which have an integrating

conceptual character. Often they may have a fictive or not-quite-real component, yet this fiction may contribute some kind of clarity or simplification, allowing the mind more neatly or conveniently to manage information.

A fantic construct, then, we may define as a virtual reference structure used to help imagine or handle ideas and things. It may be added to subject matter or somehow put into a presentational or manipulative system. This concept of fantic construct, then, extends from sequential organizations and headings of text to grossly artificial mnemonics.

("A Conceptual Framework for Man-Machine
Everything, 1973?; manuscript p. 21.)

1) We are now passing into an era where the structure of objects themselves is less important than it used to be. Not just using or hooking into objects, but structuring the perceptual and conceptual field of the user interestingly and usefully, is the problem. 2) This is the same as the general presentation problem, that of creating presentations in written, audio and other media. Thus we unite with writing, theater, movies and plastic and graphic arts: organizing for presentation to the mind. The problem is aesthetic as well as cognitive and functional. The aesthetics are important, and, if not inseparable, should not be separated. 3) The principles of psychologically

reorganizing receptors and effectors in complex man-machine systems are the same as those of organizing thoughts and other intellectual materials for presentation to the mind. The most basic principles are making things look good, feel right, and come across clearly.

("A Conceptual Framework for Man-Machine Everything, 1973?; manuscript pp. 22-3.)

We need a general terminology for the performance features and special effects that we are going to see in the coming years. Unfortunately, because of the variety of devices, modalities, subjects-matter and professional specialties touched, such a common vocabulary emerges only with difficulty.

("A Conceptual Framework for Man-Machine Everything, 1973?; manuscript p. 24.)

I think that the Grand Corpus of our written heritage, chaotic and individualized as it is, is a precious substratum of our world. The new age of hypertext and hypergraphics should build on this tradition, rather than mush us into committee authorship and indifference to the past. In forging toward the Screen Future, and the creation of screenworlds we will love to live in, let us remember and esteem the traditions, scholarly mechanisms and arts that

have worked so far, and build on them. And we must begin to worry about the problems of privacy, access for everybody, "what gets kept?" and dangers to the corpus once it is on-line.

("A Conceptual Framework for Man-Machine Everything, 1973?; manuscript p. 31.)

The psychic engineering of fantic fields-- adults' hyperspaces of word and picture, child's gardens of verses-- is our new frontier. We must look not to Asimovian robotics and the automated schoolmarm and librarian, but to the penny arcade and the bicycle, the clever diagram and the movie effect, to furnish this new realm.

("A Conceptual Framework for Man-Machine Everything, 1973?; manuscript pp. 33-4.)

Though most manufacturers steadfastly refuse to understand it, the next big computer market is at the consumer level. (Thousands of Altair computers, priced under a thousand dollars each, have been sold this year already.) But consumers will rarely want to program. The next grand market in the computer field will be variety of consumer turnkey products-- first games, then simple interactive bookkeeping and retrieval programs, such as for phone numbers, checking accounts and magazine subscriptions.

("Data Realms and Magic Windows," 1975,
p.23.)

I think it is obvious that library service is the frontier of consumer applications, and that few computer people see what this entails in all its magnitude.

A few years from now many people-- later "everybody"-- will have a computer terminal. But not just a slow old printer: a fast, high-performance vectoring CRT, which is cheaper to make and simpler to use. Writings can then be stored in full-text digital form, and readers will have highly responsive consoles-- preferably of the vector-display type, permitting the text to move smoothly at any speed under throttle control.

But merely supplying text to the reader's screen is hardly enough. Not only must your library-CRT system supply vast quantities of text at any usable rate of speed; it should also bring capabilities which are not now available in the best libraries. More about that later.

User actions must have immediate results, preferably under three seconds. This means computer capability in the terminal, as well as some local mass memory. Now, computer mainframes-- the processor chips-- will cost very little; likewise core (or RAM chips) will be cheap as dirt; but there will always be fast expensive memory and slow cheap memory. Thus for cost reasons the common notion of "core being cheap enough so we can have everything in all the

time" is forever absurd. The system must come to grips with this great truth, in terms of managing large multilevel stores on small machines.

Similarly, "whole libraries" cannot be stored at the user's terminal, but must be rapidly accessible through communication lines on demand. It follows that the system will use computers in a net. These need not be big computers, as they are to be used only for storage and distribution-- communications processors. Thus we come to the notion of a network of minicomputers. But the simplest and most elegant approach is to have all units on the network-- user nodes and communications processors-- use essentially the same program.

This is the fundamental idea of the system.

("Data Realms and Magic Windows," 1975,
p.23.)

Very well; we must supply fast-access, non-linear library services. But even that is not enough; we want also to provide users with various helpful features for their own reading and note-taking. For instance, placemarkers (to work like bookmarks), allowing instant jump to things a user has previously flagged; and software allowing users to make marginal notes.

This leads to an interesting compound capability. Not only can an author create materials in complex non-linear document form, but a reader can incorporate such a

non-linear document in a complex of his own comments, annotations and additions. Now this is a curiously involved outlook. Such compound linkages are not like anything seen usually in the computer world. But that doesn't mean it has to be disorderly. While the notion of infinite cross-coupling unnerves some people, it may be kept orderly. Whatever the complexity of the author's original version, and whatever the complexity of the user's linkages and even modifications, an orderly systems approach can keep it all systematic and sensible.

The fundamental way of keeping all this straight is with a concept implemented basically in the system. Namely, every document has an author, who owns it and is the only one who may change it. Each reader's version, containing links and modifications of his own creation, belongs to him-- except for the parts showing through from some other original. In other words, the concept of authorship is to be scrupulously preserved, as well as the author's canonical version or versions. These provide the anchor for a number of interesting services.

("Data Realms and Magic Windows," 1975,
pp. 23-4.)

I have been frequently criticized for saying what this system will do without either showing it or telling how; in this situation I am somewhat like Frank Marchuk, the man who

says he has a "laser computer." But I know that a few of you are interested in keeping track of the system prior to its actual appearance, and these remarks are for your benefit.

("Data Realms and Magic Windows," 1975,
p.24.)

Certain "instantaneous" complex events are actually not completed at the moment they appear to be, but they are in an update pipeline, and their far-flung ramifications are actually consummated in a system of ripples propagated through the file as a background task. The system is thus slightly marred by, ahem, catchup stains.

("Data Realms and Magic Windows," 1975,
p.24.)

The Office of the Future as they described it-- especially as a marketing concept advanced by a major manufacturer for mechanized typing pools-- was so appalling, bleak and absurd that no thinking man could contemplate it without a shudder.

The general view was this: the Office of the Future will be sharply divided between peons and executives. The peons will be typing clerks who have been taught to work such "word processing" gizmos as IBM's mag tape and mag card typing machines. The peons will be herded into central typing pools, where they will finger in what the executives dictate. Only a few lucky secretaries, the real smarties,

will escape this fate. Lucky them, they will get to file the paper that the Executives dictate and the Peons finger.

("Data Realms and Magic Windows," 1975, pp. 24-5.)

Look, isn't it obvious? There should be a general system of some kind, and everybody should have a display terminal. Your job determines what you may or may not see or change.

For each job there are clear and simple interactive programs-- let us call them "workfaces"-- for all the things to be done. One person may have access to dozens of workfaces, and the choice, perhaps, of which workface he prefers for a given problem. The workfaces are clear and simple. Some are more general than others, like the workface that helps you type in a letter or a memo.

There is no paper anywhere, except for letters which arrive from elsewhere or those which finally leave the office. All putters-in of information have clear and simple interactive programs to help them. Moreover, all info-dippers, too, have simple and clear interactive programs to help them. But this distinction, long with us, will erode: probably every job definition in the future will include input, viewing and revision.

Good interactive programs for everybody will enable and encourage us to use our minds better. It is my belief that people will turn out smarter, happier and more productive in

a system where they understand what they are doing, and are encouraged to use their minds.

("Data Realms and Magic Windows," 1975,
p.25.)

So much for my one thought and its possible ramifications for business programming. Through these proposed mechanisms we get our keenly responsive, people-oriented office of the future. I assume here, of course, the availability of a high-performance retrieval system roughly like that already discussed, whose principal foreground task is interactive display. I also assume that people's time is more valuable than computer time, and the computer must do its "work" at times most convenient for users.

Obviously the programmer's task has changed. Rather than living the batch life, or even the usual database life, in a way he now scuttles in shadows. His function is to implement the desired user experiences, not to dictate.

("Data Realms and Magic Windows," 1975,
p. 26.)

In all this the user's experience is central. When the techniques must be traded off against user experience, it is the experience that counts, not programming convenience.

It is this curious tradeoff that has made me coin the term "fantics" for the art and technology of showing things

to people. I believe this is the correct generic term under which interactive programming falls. I have been criticized for making the term too broad. Yet this is all an indivisible whole, and if we narrow the discussion to a smaller part, such as computer graphics, we overlook both the overall effects of what we do and the options we might have tried. "Fantics" is a single tradeoff domain. We can present the same things on paper, on screen or by ear (or using the techniques of Madison Avenue, as a joke, in a song or a playlet); we can have the user point with a light pen, type on a keyboard, tap his feet or whistle.

These options are none of them right or wrong. It is how we tie them together that is good or bad, clear or confusing, dreary or fun.

("Data Realms and Magic Windows," 1975,
p. 26.)

The interactive programmer should understand that the mere computer is not the real focus of his work. He is working in idea-space. The feeling and the idea of the system to the user emerge from all the parts acting together. The user's idea of what he is doing, and what he is doing it to; the constructs and the spaces he works with and in; the clarity of it all; these are generated in non-simple ways by the program. The computer is a paintbrush for a mural of experiences you are trying to give

the user.

("Data Realms and Magic Windows," 1975,
p. 26.)

There is usually considerable leeway in how a program can be designed. Programs that supposedly do the same thing can be as different as hats, or dogs. Many writeups on home computing in the popular presses might give the impression that the computer will do whatever you want, in the style you expect, with someone else's program. This is almost never true.

(The Home Computer Revolution, 1977, p.
91.)

Before now, most computert systems have not been set up with ordinary people's use in mind. A certain class of experienced user was anticipated and so only those people used the system. Something like trappers and explorers of old, who knew how to approach one another and observe a certain etiquette of the forest. In old-fashioned computer systems, you had to know a lot, and take actions slowly and deliberately at your keyboard. You had to think carefully before each act, and experiment systematically within very careful limits, testing each concept in detail before going on.

But that's about to change. Interactive systems will start appearing on little computers for every purpose. And we are now going to see a new kind of user: slam bang, sloppy, impatient, and unwilling to wait for detailed instructions. Thus the systems must be set up to enable such people to blunder and muddle through, learning as they go, reversing those actions which they took by mistake. The new systems will be easy, and fun and powerful, and useful.

(The Home Computer Revolution, 1977, p.
24.

No alert person, drubbed by popular magazines and TV news, can fail to have heard that we are on the threshold of some sort of new era in the use of information. Soon, we hear, we will be able to get at the Library of Congress stored on a disk, or movies in a pinky ring, and information that we want vaguely may come at us without our even having to ask.

Corporations are being formed. The hearts of investors are palpitating. Foundations and federal agencies are continuing to put out money for breakthrough showcase projects. Yet, in my estimation, we have not a state of progress but a state of confusion. Never before have so many accepted the unrefined technical fantasies of so few. Never before has so much been spent for what has been so little understood or thought out. Unfortunately, the public

has no simple comprehension of the varieties of possibilities, the vast range of options. They will believe anything they are told except the whole picture, which nobody tells them.

("Electronic Publishing and Electronic Literature," 1978, p. 211.)

It seems to me that the way to proceed now is to look at our paper world, consider its best features, and study how to preserve, extend and improve them. Then we ought to be able to design a world of electronic documents, techniques for rapidly calling them, and techniques for working on them. This could keep everything we want of the old ways while eliminating the "paperwork." Such a general framework means basically that our reading, writing and record-keeping may be simplified, clarified and etherealized-- the papers will be everywhere and nowhere, will need no filing, and cannot be mislaid.

("Electronic Publishing and Electronic Literature," 1978, p. 213.)

The structured-literature approach is based on the idea of finding a few powerful and clear organizing techniques and employing these exclusively, with the idea of avoiding idiosyncratic and exceptional forms of connection. If properly done, this need not limit the versatility of

performance of the system or its contents but may provide an ordering, which increases the flexibility and power available to the user.

A structured literature, then, is one having defined data structures of certain generalized types-- especially text and animated graphics-- and allowing certain types of link structures among them. Many types of viewing and jumps may, in turn, be devised around these link types.

("Electronic Publishing and Electronic Literature," 1978, p. 214-5.)

Actually these formulations are intended simply to facilitate the extension of literature as we have previously known it into the era of cross-linked screen access. What these specific linking ideas really do is stress the singularity of each document, its external and internal borders. Thus, we focus on the integrity of the "document" as we have long known it, the "author" as we have long known him, and an extended form of "writing" as we have long done it and read it-- rather than what some people, such as McLuhan and the video freaks and the CAI folk, have been telling us would be anonymous, collective, scrambled, psychometric, and/or Boolean.

And it should go without saying, but it must be said, that none of our freedoms should be sacrificed for any new advantages. Our files must be free from snooping, tampering, and censorship (the restricting of

accessibility). Naturally, no absolute guarantee can be put in at the computer level, but it may be that steps can be taken to make incursions-- whether by government or other source of mischief-- plain and flagrant. It is our common paramount interest to do so.

("Electronic Publishing and Electronic Literature," 1978, pp. 215-6.)