

## Abstract

Intelligibility has emerged as a persistent difficulty in interactive multimedia and hypermedia. While much discussion has focused on screen design and readability, intelligibility is a deeper problem that the hypertext literature has disregarded. Before literacy was widespread, *The Art of Memory* was widely used as a method for retaining information. This mnemonic method, both visual and symbolic, was used to map new information onto familiar and symbolically significant structures which provided frames for the organization and interrelations within informational clusters.

More than computer metaphor, *The Art of Memory* is presented to offer insight into intelligibility. It is offered as a model for the non-text based organization of multimedia presentation: one that can provide semantic contexts within which communications are intelligible.

## Hypertext & The Art of Memory

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### Introduction

We are in an age of hypermedia. Contemporary communication is often fragmented, and comes to us collaged by its very density and its multiple media including text, sound, image and motion. Individual communication is losing its identity, and our focus is moving from the isolated work to the network. This transformation from text to hypertext is proceeding, as we increasingly rely on symbolic manipulation and recombination to construct economic and cultural life. Understanding fragmented and linked communication is more than an academic matter.

The hypermedia of contemporary communication is not quite the hypertext envisioned by its pioneers, nor the hypertext of postmodern literary criticism, in which the linearity of text is equated with the power of authorship and the break-up of the linear text is equated with the liberation of the reader. Current hypertext is multimedia, and it includes a range of communications from books to Automated Teller Machine transactions.

Hidden underneath the litcrit discussions lie more subtle and difficult questions of intelligibility. As competent readers, we handle linear texts by taking notes, reordering and analyzing writings for our own needs. In reading current hypertext: web pages or interactive computer games and applications, our tasks also include figuring out what is notable and for what purpose we might use it. These problems are often referred to in terms of navigation and orientation (what is it? how can I get around it?).

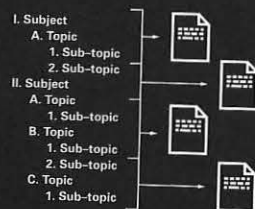
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### Linear Text

The Linear text maps what is conceptually or topically a highly non-linear structure into a single thread of presentation or reading. We often do not read text linearly, but we know texts are usually constructed for linear reading, so that concepts are defined early in the writing and presumed thereafter. In this sense, linear texts preserve a memory of themselves.

Linear reading of such texts can give us the semblance of knowing the concept map, but without making the complex interrelationships explicit enough for us to actually construct the concept map.

We are literate readers: accustomed to genres which encode the reader, author and purpose of the communication into their forms; we are accustomed to the outline as our model of intelligible structure in printed texts. That sense of outline enables us to linearly traverse complex structures (we go from I.b.2. directly to II.A.1). To that model, hypertext adds the topical link-node diagram which is offered as an intelligible data structure. Current media add the situated speech of conversation, image, sequence, motion and structures of interaction. These are different and new: there are few genres that provide us with the expectations we need to navigate and orient ourselves.

The Art of Memory, a mnemonic tradition that began in ancient Greece and persisted through the Middle Ages, the Renaissance and into the seventeenth century gives us an account of how people could hold and organize thoughts, making of themselves walking books without using the written word. It may also point toward ways for developing visual and narrative models of intelligibility to apply to new media.

We are concerned with five basic points:

1. The notion of hypertext should include interactive media in general including multimedia.
2. Intelligibility is the most fundamental problem of all multimedia.
3. The computer age notion of information is a cultural construct that presents both a means and a barrier to understanding hypermedia.
4. The application of postmodern literary theory to hypertext has often involved critical confusions and is misapplied beyond hypertext based literature.
5. The Art of Memory provides us with a way to open questions of intelligibility through structure, visible form, metaphor and narrative.

Hypertext is as much a term for understanding as it is an objective phenomenon. It is perhaps the best ready-made method for considering the problems of interactive media. The history of hypertext has been shaped by theories and attitudes that are already realized in the work produced. Many characteristics of hypertext are socially constructed; the common understandings make communications intelligible. It is important to work toward constructing those common understandings. When we consider "common understandings," we know that they may not be universally held and are often distinctly not those of leading thinkers. Common understandings are often not explicitly documented; they are vague, inferred and debatable. For example, this article asserts that computer information is commonly understood to be disembodied, scientific and objective. To the contrary, Richard Coyne, in *Designing Information Technology in the Postmodern Age* asserts that "...the operative philosophy of the computer world is not logical positivism, or even analytical philosophy, but liberal pragmatism...Neither is the computer world inhuman, driven by a kind of 'techno-rationalism.'"<sup>1</sup> The computer world may no longer be considered scientific and authoritarian

<sup>1</sup> Coyne, Richard. 1995. *Designing Information Technology in the Postmodern Age*. Cambridge: MIT Press, preface, XI.

by its developers, but it once was and it has been popularly thought of that way until very recently. These issues open up a number of questions. Whose beliefs shape media like hypertext? Are outmoded opinions still important? Does the malleability of beliefs make artifacts like hypermedia malleable, or will hypermedia remain fixed in some respects by the body of products produced?

While it is quite beyond this paper to discuss these possibilities, they are relevant questions. Will change be revolutionary, continuous or will the forms remain fixed? We have some historical precedents: cars, bicycles and radio electronics all show the tendency to change in ways that resemble plate tectonics, i.e., to coalesce from a period of fluidity into a fixed form which remains until stresses force a change, which results in another period of general or special quake and confusion, coalescing into another period of fixity. The modern bicycle took shape near 1880, and has changed little since. Broadcast has three major periods: am, fm and television. Cable and digital appear to be the fourth and fifth. We are certainly in a quake zone within communication, and the ability to form the next stage will be a matter of social power, and a matter of establishing a set of concepts adequate to analyze current pressures.

Within this context, it is not possible to be definitive about the proper interpretation of hypertext and its nature, but, again in the words of Richard Coyne, to "open up a space" in which questions and possibilities can be organized and discussed.

## Hypertext & The Art of Memory

## Hypertext & Computer Use: Data, Texts, Programs

Despite the novelty of hypertext, it comes with cultural heritage: the culture of the computer as a scientific tool, and the culture of postmodern literary criticism. Our model of hypertext comes as much from these two cultures as from any inbuilt characteristics. This is part of the hypertext problem.

The notion of hypertext arose within the context of computer communication: data-based, complexly interrelated, and fast, as we operate the machine not to produce a physical output, but to read its states as it processes. Hypertext is a natural and intuitive extension and evolution out of computer information codes – particularly ASCII – and of computer databases. From this, hypertext as a notion gets three of its major characteristics: 1) its bias toward text (letters and numbers), 2) its reuse or recombination of text and 3) navigation of text data by pointers or links.

How is text different from image? In Western culture, there is a very large literature discussing the relationships between text and image and a historical tendency to see the two as distinct and often opposing forms.<sup>2</sup> Within this literature, text and image are often opposed on the basis of our greater ability to parse text grammatically, and thus to pin down its meaning. Nelson Goodman in particular, has distinguished text from image by its single system coding, i.e., language, and our agreements on the meanings of words. In images, by contrast, there are often not only multiple readings, but there are not necessarily any set rules for deciding which aspects of the image are to be considered. Thus, if it is a painting, we may or may not consider the brush strokes or the

<sup>2</sup> Sources providing detailed discussions include Mitchell, W.J. T. 1986. *Iconology*. Chicago, University of Chicago Press. Stafford, Barbara Maria. 1994. *Artful Science*. Cambridge, MIT Press. Gombrich, E.H. 1996. *The Essential Gombrich*. Phaidon. Langer, Suzanne K. 1967. *Philosophy in a New Key*. Cambridge: Harvard University Press.

texture of the canvas as relevant to the content. If that is the case, the text can be rendered by any duplication of the symbols on any sort of medium, while the only reproduction of an image is the image itself.<sup>3</sup>

By and large, computers operate on images without parsing them; e.g., copying them pixel by pixel, by region, etc., without hierarchy or relation beyond belonging in the set or file. (Images can be coded for example in medical data or satellite gathered images.) In contrast, within text, we presume coding. Computer languages are built using grammars of textual and numerical symbols which can be analyzed in the same way we solve mathematical formulae. Diagrams and formulae actually operate in a middle ground. Formulae look like language but operate via graphical transpositions — move a divisor across the equal sign and it becomes a multiplier. Diagrams look like pictures, but language-like rules govern their interpretation. Thus, we often see the rendering of numerical data and propositions in diagrams as literal: a diagram can be correct or incorrect, and two different looking diagrams can be identical in the information they convey. Similarly, an image can generally agree or disagree with a description: this person has two eyes. But no two different pictures can be deemed logically identical, and in general, the translation from language (e.g., story) to image is an “adaptation,” or “interpretation,” which is to say a translation into a different medium in which there are no precise correspondences, only certain overlaps.

What distinguishes text is not only the set data that is deemed relevant, but also that the rules for interpreting make it possible to disassemble the data, into sentences, phrases, clauses and words — with presumably discrete meanings — and then to reassemble it again. These ideal types: text as precise or “digital,” and image as “analogue” are often the standards by which we form our expectations, and they establish the validity and credibility of images and texts.

#### Text conditions image

One interesting wrinkle is that markup languages like HTML, the language used on the internet, employ coded instructions governing appearance. These provide a computer-related approach for looking at visual effects in language-like terms, offering a possible route to building visual taxonomies.

<sup>3</sup> See Goodman, Nelson. 1976. *Languages of Art*. Indianapolis: Hackett Pub Co. 1978. *Ways of Worldmaking*. Hackett Pub Co.

<sup>4</sup> Landow, George. 1994. *Hypertext Theory*. Baltimore: Johns Hopkins University Press, 4.

Computers add yet more layers between setting and communicative essence like screen size, rendition in greyscale or color. Creating for the computer includes designing for a variety of different output devices and readers all of which will look different to the user, but all of which are expected to present the same information to that user. The computer makes obvious what has always been true. “...the central point about electronic textuality — its fundamental distinction from the object on which it is read.”<sup>4</sup>

#### Computer information

We are more likely to think of computer text as impersonal information. The symbols computers manipulate are often machine-generated: data, shaped by programs and produced as output. Even our language biases us toward seeing computer data as objective, non-human and certainly not as human narrative. We tend to see such output as information that appears independent of author and of receiver — something discovered. Email, news groups and web pages may be reintroducing authorship and narrative, but they do so within a space of computer information that did not exist until very recently.

We can see this bias toward text, toward impersonal writing and reading environments and toward a belief in the universality of knowledge in the writings, including this essay on computer style sheets:

*Since the beginning of the Web just a few short years ago, HTML designers have had to serve two audiences. On the one hand, the prime audience for web pages is, rather obviously, people. Yet the HTML language syntax is geared more towards creating machine-readable text rather than text meant to look good for readers. For example, there are HTML commands for declaring that a text chunk is a definition, an ordered list, or a table; there aren't commands for setting margins or font.*<sup>4</sup>

Here is the search for universal knowledge: Computers and hypertext were often seen as ways of building universal objective knowledge systems. Early architects of Hypertext theory saw hypertext as providing a method for constructing a universal environment for human information use, e.g., Ted Nelson's Xanadu:

*...the Xanadu system provides a universal data structure to which all other data may be mapped ... (Nelson, 1987, 1) But*

*the developers have much more in mind than a computer data structure. They see writers and readers throughout as working in the same conceptual space.*<sup>5</sup> [emphasis added]

Let us stop here to ask a question "What is the relationship between data and knowledge?" We think of knowledge as being something closer to idea, or concept. How would we order such terms as data, information and knowledge, and let us add wisdom. We could order them on a line: data is stuff, information is data selected and arranged according to some principle or goal, knowledge is the principle or goal known through the information. Here, we move from the most concrete to greater levels of abstraction, into which lower levels fold. This is the process by which perception becomes cognition, and by which events are glued into larger structures. When we come to wisdom, we have lost direct touch with the most concrete levels. Thus, we have two poles: concrete and abstract which we traverse up by concept formation and back by verification. The uses of terms like information and data elide or disregard this characteristic. They beg the question of whether computers can think by presenting it as a non-question.

In the 1945 *Atlantic* article "As We May Think," Vannevar Busch was concerned with the explosive growth of research and information, and within it, our inability to process as its limitation. His solution to the information glut was greater human efficiency with the aid of the "memex."  
*... Consider a future device for individual use, which is a sort of mechanized private file and library. It needs a name, and to coin one at random, "memex" will do. A memex is a device in which an individual stores all his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility...*<sup>6</sup>

Thus, within at least that early computer information model we see tendencies to look at text as autonomous information, and the implicit view that packets of information have an integrity like standardized components used to make novel entities rather like modular housing. By the same token, a person is a human information processor.

The human processor is machine-like, which is to say logical or rule governed, but it links information by rules of association. In his article, Busch defines "association."  
*The human mind does not work that way [alphabetically]. It*

<sup>5</sup> Bolter, Jeff. 1991. *Writing Space*. Hillsdale, New Jersey: Lawrence Erlbaum, 102-103.

<sup>7</sup> Busch, As We May Think.

<sup>8</sup> L.S. Vygotsky, was a developmental psychologist active in Russia during the 1930's who first came to light in the United States through the work of a student, A.R. Luria. Vygotsky's work mirrored and opposed much of Piaget's work in child development. Vygotsky's theories, particularly of language development, and his concept of the "zone of proximal development" have become increasingly recognized within American psychology as it has turned away from behaviorism.

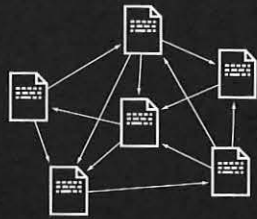
<sup>6</sup> Busch, Vannevar. 1945. *As We May Think*. *The Atlantic Monthly*, July.

*operates by association. With one item in its grasp, it snaps instantly to the next that is suggested by the association of thoughts, in accordance with some intricate web of trails carried by the cells of the brain. It has other characteristics, of course; trails that are not frequently followed are prone to fade, items are not fully permanent, memory is transitory. Yet the speed of action, the intricacy of trails, the detail of mental pictures, is awe-inspiring beyond all else in nature.*<sup>7</sup>

Hypertext, then, is information organizable according to the operative rules of the human brain: a technical solution of the perceived need to increase the efficiency of the human information processor.

The term "association" has two aspects: the lack of a narrator and the problem of deriving concepts from data. Hypertext lacks the author who selects, arranges and edits the text (here the data) to build a structure of interrelated ideas or concepts, thus making it information. The crux of the problem, then is how to find or make the glue that bonds these separate texts together into larger coherent and intelligible units. In this context, Busch uses the notion of "association" which has a long history in Anglo-American philosophy. It argues that we build knowledge by associating things together. Unfortunately, when we build breadth of knowledge, we must also build depth; in order to make sense of all of the data we have collected, we need to provide a concept that orders it. This barrier has dogged association theory. By contrast, Gestalt psychologists emphasize that for us, the concept is a container for the data and often of a fundamentally different category from the data. Developmental psychologists, like L.S. Vygotsky<sup>8</sup> come at this problem from two different directions: that our notions of things become more differentiated, and that the ability to form ideas is not a spontaneous process at all but is socially passed from adults to children. Association theory fails to deal with these issues. Within that theory, having knowledge grows more directly out of data possession rather than concept formation.

Another aspect is the distinction between observation and message reception. Within the computer, information exists both as data to be interpreted and as messages or programming. First, information is the universal stuff of which everything is made. Without information (or data), there is nothing to work on. But within computers, information has another connotation as well. Information includes all of the



### A Model of Hypertext

Hypertext is the non-hierarchical linking of texts navigated by the user. Often, but not always, such texts have one or two entry points, however they could be entered at any point. Once hypertexts achieve an adequate level of complexity, it is unlikely that any reader will find all of the text, and different interpretation will almost invariably result from different orders of reading. Often, each text presents a single concept or topic. Since the order of reading cannot be presumed, hypertexts have greater difficulty presenting a memory of themselves, and thus, of building a presentation through time or of providing an orientation to the whole.

messages passed back and forth to trigger all of the computer's operations. In these two respects, computer information is different from human information.

Markup languages like HTML contain text mixed with instructions on how to treat that text – instructions and data mixed. They are not alone in this. Word processor files use markup languages, and all files contain headers and other information telling where they begin and end and how to interpret them. On the computer, there is often no difference in form between instruction and data.

Within the computer, information often has no occasion, no point or time of origin or syntactic or semantic context. When we ask a friend a question, we know where we are, have an idea of what he or she knows, how the answer might relate to the larger conversation we are having, etc. This “postmark” often overshadows the information telling us whether it is truthful, ironic or a joke. Computer information often carries no such postmarks, which, as we know, is partly why it can be dangerous.

### Information processing

We can draw some initial contrasts between computer information and human information processing. For us, information is most often a relationship of foreground and background. The background is what we know or presume to be true, against which something contrasts. Information is something that relates strategically to a set of expectations: it creates, confirms or refutes them. Information is semantic: data that has some significance to a story. We acquire new information against a background of experience and we process it by checking it against that background. Computers do not have such a systematic routine for accepting new information: computer data does not exist with reference to stories.

For people, information often involves the matter of inspection, interpretation and decision making. It involves shifting the conceptual frame. My friend's car in the driveway is a sure sign that he has returned from his vacation. That is a link made by me, a story I am making using evidentiary material. Thus, information belongs to the receiver. As a viewer, *I* inspect the information and *I* ask what it means to *me*. A law becomes information when I ask myself why it was enacted, and decide whether I will comply with it. If the data do not seem to cohere, it is I who must fish around for or create a new concept by which to order and glue the data.

Information also can and often does operate as message, as when I read the sign and react without conscious consideration. At the same time, if your messages can anticipate my interpretive questions and elicit a response, they can manipulate or program me. If you are able to enforce an interpretive frame, we have distorted communication of the sort Frankfurt school philosopher Jürgen Habermas addresses.<sup>9</sup>

<sup>9</sup> See Habermas, Jürgen. 1987. *The Theory of Communicative Action*. Boston: Beacon Press, or 1991. *Communication and the Evolution of Society*. Cambridge: Polity Press.

Finally, unlike computer information, manmade text is produced in a particular place and time and has perceivable markers to that place and time. Historically, it has been produced as narrative, a stream of words from speaker to hearer or writer to reader. Information is as reliable as the writer himself. This occasioning of text is characteristic of pre-computer communications, and it is being reasserted in forms like email and newsgroups.

#### Summary on interpretation

Computers are a particular technical and cultural formation. We have beliefs about them that condition our use of them. Within computers, programs determine the interpretive frames according to pre-planned, rule-based procedures, which are typically predetermined or closed rather than open ended. Since Hypertext emerged from computer information, Hypermedia models of communications have been very much influenced by computer ideology, toward models of information that are objectified and decontextualized.

Thus, the computer model of information when applied to humans is tendentious in three respects: 1) information as data versus as a figure-ground relationship, 2) information as programming, versus as an output of interpretation, 3) information as objective reality, versus information as narrative. Most particularly, these models fail to adequately engage the most important question: intelligibility.

In short, tendencies have converged to produce an ironically naive view of information and interpretation within hypertext theory. These include the ideology of computers as scientific: particularly in terms of the apparent clarity and objectivity of computer data, the belief in the possibility of universal knowledge, the confusion between text and work. The view of information they present is mechanical, not human. Not only have these been the views of readers; they have also been the views of the creators of hypermedia communications, and in that sense they are self-fulfilling.

## Hypertext & The Art of Memory

## Hypertext and Litcrit

If intelligibility is the primary problem within hypermedia, part of the intelligibility problem comes from the novelty of hypermedia, but an important part also comes from the understandings hypermedia producers bring to the field. This problem stems in part from analytical deficits: a bias toward text, and within that a computer-based theory of information and a tradition of literary criticism which is too narrow, too much based on traditional forms, to understand the breadth and novelty of hypermedia.

Hypertext literary theory developed as postmodern literary criticism joined software environments like "Owl" and "Story Space" in which hypertext manipulation is possible. There was considerable convenience to this marriage. Hypertext linking enables multiple texts to be joined. Postmodern theories are concerned with the ways multiple texts come together to form larger communications, and how they presume or live out larger unstated cultural forms. *"For example, like much recent work by poststructuralists, such as Roland Barthes and Jacques Derrida, hypertext reconceives conventional, long-held assumptions about authors and readers and the texts they write and read. Electronic linking, which provides one of the defining features of hypertext, also embodies Julia Kristeva's notions of intertextuality, Mikhail Bakhtin's emphasis upon multivocality, Michel Foucault's conception of networks of power, and Gilles Deleuze and Félix Guattari's ideas of rhizomatic, "nomad thought." The very idea of hypertextuality seems to have taken form at approximately the same time that poststructuralism developed...both grow out of dissatisfaction with the related phenomena of the printed book, and hierarchical thought.*"<sup>10</sup>

<sup>10</sup> Landow, *Hypertext Theory*, 1.

This is also, fundamentally a text, and here I mean a word-oriented tradition. Leaving aside such visual examples as Barthes' *Camera Lucida*, the deconstructions of Max Kosloff, Susan Sontag and Christian Metz, the majority of litcrit has focused on text, both as the object of study and as a mode for studying other things: in which subject matters are "texts," as in Stanley Fish's "Is There a Text in this Class?"<sup>11</sup>

Particularly among computer based hypertext authors, there is generally little reference to any mode other than text, and there seems to be a presumption that the methods of text can be applied to images. The hypertext authoring environment Story Space, for example, does not allow for even minimal visual manipulation of text or layout outside of the link-node mapping.

"Essentially, one must do for visual information what one already does far more easily for verbal information – store it in a central repository (database) so that one can share it among many readers by means of a network" ...<sup>12</sup> More easily, indeed. Image taxonomy is turning out to be a very difficult proposition. Sometimes, the best method is to flash images in rapid succession and rely on visual recognition rather than an ordered taxonomy.

Given the text bias of hypertext litcrit, there is an often displayed elision or confusion that concerns text and information. It is between two meanings of the term text:

1. The text as the physical setting of words and lines
2. The text as the intelligible thing being written, the meaning or more properly content behind the empirical text setting.

Both exist and are linked together because the physical setting only exists as text insofar as it is read and interpreted, but that intelligible text is only available through the reading of the physical text. Some authors call this the distinction between the physical text, and the "work" as the thing we find in the reading. "Work" has its problems since it indicates a closed entity, yet many postmodern theorists break down the edges between texts. Often, the same word – text – is used without differentiation and this leads to confusion.

In the introduction to *The Digital Word*, Paul Delaney and George Landow describe "the dispersal of the text" through the computer's ability to disperse and recombine texts. This paragraph makes sense when the text being dis-

<sup>11</sup> Fish, Stanley. 1980. *Is There a Text in this Class*. Cambridge: Harvard University Press.

<sup>12</sup> Landow, *Hypertext Theory*, 11.

persed is what we have called the work, while the recombining and manipulation is of texts as physical settings or as "documents," the files or internet web "pages" which form the fundamental units of computer communications. Landow and Delaney are certainly aware of the distinction between text and work, but it is easy for a reader to miss. Many others write as if manipulating text documents were the same thing as manipu-

lating the work, unless, of course, we presume that there is some larger "work" of which all texts are parts, and this is what the notion of social "intertextuality" suggests.

Texts stand in front of the work. We have to be able to find the work through the texts before we can manipulate it. Manipulating the texts is not the same thing as manipulating the work, and

manipulating the texts before the work has been set forth often obscures it. Thus, we return to the central problem of hypertext, making it intelligible.

This confusion of text and work is an ironic error, particularly given the "fundamental distinction [of the textuality] from the object on which it is read." This conclusion comes from reading through the screen to the metaphorical piece of paper behind it, when the "work" is actually the communication which is behind that piece of paper.

To return to Stanley Fish, the book *Is There a Text in this Class*, revolves around that question in its two meanings, i.e., "Is there a textbook used?" and "Does this class have an agenda or cant?" Similarly, Fish considers experiments, intended and otherwise in which lists of names, words or other markings on blackboards are interpreted in radically different ways by different classes, e.g., as poems or lists of saints. The different interpretations Fish reports are conditioned by the different classes as "interpretive communities" based on subjects (religion, English). Fish's work stresses the multivocality of language, that it can be interpreted in many different ways. But is language infinitely interpretable? If so, why are hypermedia so often disorienting or unintelligible?

#### *Dispersal of the Text*

The material requirements of printing and publishing created "containers" for text with a standard size and format, such as the journal article or book. Digitized and networked texts smash the containers. A traditional-size text may be broken down into smaller units or scaled up to merge with a docuverse of related texts (Delany). Instead of acquiring a complete Xerox copy of one scholarly article, we may now use a text manager or search engine to obtain from many articles just the paragraphs or footnotes relevant to our own project. Conventional ideas of the book and the author were called into question in the sixties by such poststructuralist concepts as intertextuality and the dissolution of the subject. These conventions are now challenged in a much more literal way by the computer's capacity to manipulate, to disperse, and to recombine the elements of digital texts (Landow, *Hypertext*). New textual forms, such as hypertexts or phrasal graphs (Lancashire), are emerging. New kinds of careers and disciplinary influences will also emerge in the universe of networked discourse: seminal figures like Nelson (the godfather of hypertext) may

Paul Delany and George P. Landow

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Landow, George, and Paul Delaney. *The Digital Word*, 15.



### Multimedia

Text, image, sound, motion and sequence or animation are combined within a single presentation to form multimedia. Multimedia can include user interaction, as when the screen state changes in accordance with user commands.

In Fish's cases, students already possess senses of "work" which they apply to the empirical texts that they see. These are classroom blackboards seen in classes, which are well understood settings in which there are particular expectations. These expectations follow rules regarding occasion, in this case, classes. As signs in public places, they might have different meanings, though there too, we have interpretive rules which artists like Jenny Holzer exploit. Imagine yourself seeing a street sign flashing a list of names or words. What are the questions you would ask yourself as to what this meant? How would you reevaluate after each new word? Thus, how would you be searching for the interpretive rules?

Similarly, Hypertext literit is often concerned with revolutionizing traditional forms: novels or poems and is operating against a known print culture: *Technologies like that of book printing and the institutions coupled to it, such as literature and the university, thus constituted a historically very powerful formation, which in the Europe of the age of Goethe became the condition of possibility for literary criticism: To authoritarian and hierarchical forms, hypertext adds another*

*liberating one: If linear and hierarchical structures dominate current writing, the computer now adds a third, the network, as a visible and operative structure.*<sup>13</sup>

1. A text is what you read, the words and phrases that you see before your eyes and the meanings they produce in your head.
2. A text is a message, imbued with the values and intentions of a specific writer/genre/culture.
3. A text is a fixed sequence of constituents (beginning, middle, end) that cannot change.

Many theorists write of traditional literary structures not in terms of intelligibility, i.e., how stories make sense, but in terms of power. Thus, traditional book writing stresses hierarchy, author, linearity of the text and the book publishing industry. Against this backdrop, computer hypertext can liberate by destroying the individual work, the single author, by empowering the reader to reorganize and tell his own story, and by allowing for collaboration on a project. So it is argued.

What does hypertext fiction look like? It looks very much like meta-fiction. When a genre becomes well enough known, it becomes possible to write meta-works. The Rock'n Roll live album presents the old hit in a new way, often as variations on the original. Hypertext fiction is about the problem of its own reading.

Hypertext functions by the displacement or inflection of normal reading; readers already possess a sense of how the root novel should work, so they look for it, just as listeners bring their knowledge of the recorded songs to rock concerts.

What happens when a problematic story structure is presented in hypertext? *In fiction the story determines and hides behind the plot, which produces the action, whereas in cybertext, the plot itself is hidden, and so the discursive causality is reversed: action determines (or searches in vain for) the plot, which if found does not produce anything interesting, only (barely) closure.*<sup>14</sup>

Here, the distinction between the text and the work shows itself. Hypertext theory writes of hypertext fiction as a rearrangement of the text to alter the work (given that we already have a good idea of how we think the work is structured, an idea that comes from a four hundred year history of traditional novels). We are students in Stanley Fish's class.

<sup>13</sup> Bolter, *Writing Space*, 113.

<sup>14</sup> Aarseth, Espin, *Nonlinearity and Literary Form*. In Landow, *Hypertext Theory*, 74.

But what if we do not already know or think we know the song, or even what a rock and roll song is, i.e., if we do not have a conception of the genre being inflected? How, then, can we get to the work if we don't have the empirical text in its totality and order? In hypertext novels, it is not the intelligible work that is being manipulated, but the physical text on the page through which we read it. Do we imagine that the manipulation of the text in one way will result in a parallel manipulation of the work?

Our experience with hypermedia seems to indicate that without a pre-defined conception of the work, e.g., the plot line of a story, we may have little hope of making sense out of hyper-recombination. This is a particular problem when we attempt to use hypertext to build a new form.

**Summary:**

**Litcrit, and computer information**

The interest here is not in a general criticism or debunking of postmodern literary theory. Hypertext litcrit is criticized to argue that it is best applied to established genres like fiction, and not necessarily applicable to emerging genres or to hypermedia as a whole. Unfortunately, the preponderance of hypermedia theory has been developed according to this model. Like the computer-based information model, it is partial. Both models presume the intelligibility that needs to be constructed. In order to explicate the limitations posed by the way both of these approaches are based solely on text will require a fuller discussion of the history of image use.

## Hypertext & The Art of Memory

### Visual Models: The Art of Memory

There are models other than computer information and literary criticism in hypermedia production. These include the use of metaphors to create a sense of the whole, e.g., stage and dramatic metaphors. Kevin Lynch's model of urban structure including its paths, nodes, edges, sections, landmarks and various architectural metaphors can operate to present us with images of the structure of the information. In addition, graphic designers have tried to apply principles of iconography, page layout, color theory and graphic organization. In fact, the use of the notion of metaphor is common in computer parlance, though what we see is usually simile (looks like) rather than metaphor (acts like).

Approaches from the arts have broadened the conception of hypertext, introducing vision, sound, sequence and motion creating hypermedia for a much larger audience. But without a common theory or base, the use of multiple media is often eclectic and ad hoc. The available techniques have often not been adequate to address the intelligibility issue: the ability to see the presentation as a whole and to see its relationship to the outside world.

The problem of seeing and retaining complex information is older than print. The ancients did not rely on print in the way that we do. Rather, they had to memorize or retain information, not just principles but often long narratives, which had to be delivered accurately, on demand, over periods of years. The principle ancient mnemonic device was called "The Art of Memory." The Art of Memory was essentially metaphorical or analogic, and visual rather than textual. It provided a system of memorization using a set of principles

quite distinct from what we know as rote memorization. While much that has been written on it has focused on its use and power, the emphasis here is on a theory of memorability based on intelligibility through visual structures as concept maps. We can examine The Art of Memory for aids in developing modern hypermedia. It gives us insight into the structure of what Vanevar Busch called "association." It also provides systematic ways of talking about intelligibility in multimedia. It relates to visualization, it is very much concerned with the acquisition of new knowledge, it plays upon methods that we use informally, and it is a tradition that survives today.

But before we proceed, one warning is in order. The Art of Memory is a mnemonic tradition with roots in archaic Greek civilization. It seems to have been handed down orally. As a result, the source texts are fragmentary. Some were lost, and those that remain seem likely to have been written for people who were expected to already know the basic methods. They do not seem to have had a theory of The Art of Memory. Instead they had rules governing practise given in figurative language and we will have to grope for theoretical bases that would satisfy us. Studying these texts leaves us with the distinct impression that in these non-modern cultures, visualization was in itself an important method of theory building. It may have been more important than text.

### What is The Art of Memory

*The artificial memory is established from places and images ... the stock definition to be forever repeated down the ages. A locus is a place easily grasped by the memory, such as a house, an intercolumnar space, a corner, an arch or the like. Images are forms, marks or simulacra [formae, notuae, simulacra] of what we wish to remember. For instance if we wish to recall the genus of a horse, of a lion, of an eagle, we must place their images on definite loci.*

*The art of memory is like an inner writing. Those who know the letters of the alphabet can write down what is dictated to them and read out what they have written. Likewise those who have learned mnemonics can set in place what they have heard and deliver it from memory. 'For the places are very much like wax tablets or papyrus, the images like the letters, the arrangement and disposition of the images like the script, and the delivery is like the reading.'*

*If we wish to remember much material we must equip ourselves with a large number of places. It is essential that the places form a series and be remembered in their order, so that we can start from any locus in the series and move either backwards or forwards from it. If we see a number of our acquaintances standing in a row, it makes no difference to us whether we tell their names beginning with the person standing at the head of the line, the foot or in the middle. So with memory loci. 'If these have been arranged in order, the result will be that, reminded by the images, we can repeat orally what we have committed to the loci, proceeding in either direction from any locus we please.'*<sup>15</sup>

15  
Yates, Francis.  
1994. *The Art of  
Memory*. London:  
Trafalgar Square, 6.

So quotes Francis Yates from one of the classical texts in which The Art of Memory was discussed. The methods were often architectural, utilizing a building or space as a template within which memories could be stored. Memories can be constructed for words or things: things being what is to be remembered, and words being the precise set of words to be used in presenting them. One would be mastery of the subject, while the other would allow reliable presentation of a speech. Clearly, it is most desirable to have both.

Both architectural locations and images used for memory have specifications in terms of appropriateness. *'Memory loci should not be too much like one another, for instance too many intercolumnar spaces are not good, for their resemblance to one another will be confusing. They should be of moderate size, not too large, for this renders images placed on them vague, and not too small... not too brightly lighted... nor too dark...'*<sup>16</sup>  
In short, the spaces should be such as would be conducive to viewing.

16  
Yates, Francis.  
1994. *The Art of  
Memory*. 7.

Images are a different matter. This discussion follows a series of questions regarding why some images are so sharp while others are so vague that they hardly stimulate memory at all? Images that are striking, active, clear, beautiful or ugly are memorable.

One example goes considerably beyond these very general descriptions. *The first is an example of a 'memory for things' image. We have to suppose that we are the counsel for the defense in a law suit. 'The prosecutor has said that the defendant killed a man by poison, has charged that the motive of the crime was to gain an inheritance, and declared that there are many witnesses and accessories to this act.' We are forming a memory system about the whole case and we*

shall wish to put in our first memory locus an image to remind us of the accusation against our client. This is the image.

We shall imagine the man in question as lying ill in bed, if we know him personally. If we do not know him, we shall yet take some one to be our invalid, but not a man of the lowest class, so that he may come to mind at once. And we shall place the defendant at the bedside, holding in his right hand a cup, in his left, tablets, and on the fourth finger, a ram's testicles. In this way we can have in memory the man who was poisoned, the witnesses, and the inheritance.

The cup would remind of the poisoning, the tablets of the will or the inheritance, and the testicles of the ram through verbal similarity with testes of the witnesses. The sick man is to be like the man himself, or like someone else whom we know (though not one of the anonymous lower classes). In the following loci we would put other counts in the charge, or the details of the rest of the case, and if we have properly imprinted the places and images we shall easily be able to remember any point that we wish to recall.<sup>17</sup>

Taken as a representative of images that are vivid and memorable, we see the following characteristics:

**Analogy:** the structural relations in the image can be transferred to the situation.

**Mapability:** the constituents of the image can be mapped onto individual constituents of the situation.

**Coherence:** the image has a unity of order that can be used to interpret the situation.

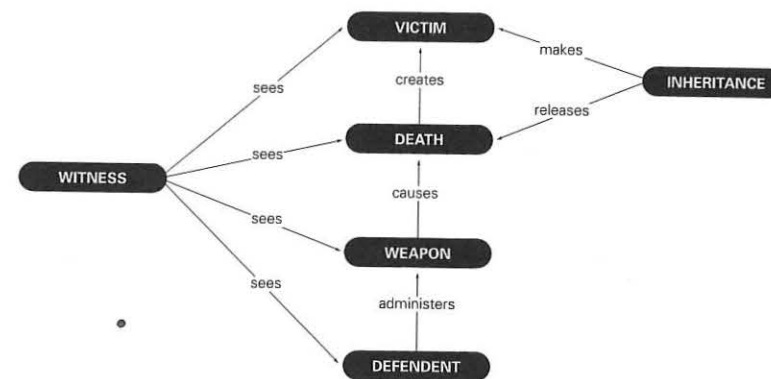
**Significance:** the image projects a significance or content which can be transferred to the situation.

**Rhetoric:** in sum, the image constructs the situation according to its template, enabling us to see the empirical situation as a mirror of a created one.

Thus, we have something considerably greater than any apparently arbitrary mnemonic device. The image presents a rhetorical frame for the interpretation of the events which makes an intelligible theory of the case. But that frame does not function in the literal sense. Rather, it is a concept structure that both the image and the situation can be used to invoke. It arranges poisoning, inheritance, victimization, knowledge. In the image we have materials of a concept map. Here is one way of drawing a concept map: a link node diagram with the links marked. It provides us with a map of the configuration and connections of the entities in such a way

17  
Yates, *The Art of Memory*, 11.

that we can imagine various points of view from which to look at it. The links also indicate change over time, pointing at the dynamic or narrative aspects. This concept map can be applied to both the image and the events in the case, providing a common meaning or theory for both. The theory arranges and selects the details to be included, giving each a meaning. The



empirical details are concrete objects that we use for interpretation. Here mnemonics and interpretation are closely linked in the unity of an image with its sense of structure, and its potential narrative. The image provides the concept map and provides specific positions or "mappings" for all of the significant facts of the case. Thus, the image functions allegorically and diagrammatically, summarizing that allegory in a single image which simultaneously carries the essential elements in a physical configuration that suggests a narrative of events in the case.

We notice also that some of the signs are natural, i.e., the sick man as evidence of harm being done and poison as the potential for doing harm, while others are learned symbols — the ram's testicles to signify witnesses. The concrete aspects of the image link concepts to the world of experience, while the concepts make the world of experience intelligible. But, as viewers we must interpret the image by examining it for its possible meanings.

### Image and word in the pre-modern world

Certainly, the written word is at a disadvantage in essentially oral cultures. Ivan Illich documents that in the twelfth century, reading was a visceral, physical action, in which words were read aloud with expressive intonation. *In a tradition of one and a half millennia, the sounding are echoed by the resonance of the moving lips and tongue. The reader's ears pay attention, and strain to catch what the reader's mouth gives forth. In this manner the sequence of letters translates directly into body movements and patterns of nerve impulses. The lines are a sound track picked up by the mouth and voiced by the reader for his own ear. By reading, the page is literally embodied, incorporated.*

*The modern reader conceives of the page as a plate that inks the mind, and of the mind as a screen onto which the page is projected and from which, at a flip, it can fade. For the monastic reader, ... reading is a much less phantasmagoric and much more carnal activity: the reader understands the lines by moving to their beat, remembers them by recapturing their rhythm, and thinks of them in terms of putting them into his mouth and chewing. No wonder that pre-university monasteries are described to us in various sources as the dwelling places of mumblers and munchers.<sup>18</sup>*

This view sees writing as a path to reading, and reading as a method of recreating oral discourse. The cognitive setting remains discourse as an activity: physical speaking.

It is easy for us to misinterpret mnemonics like the art of memory and attribute its use simply to illiteracy. For the ancient Greeks and Romans, spoken narrative was a dominant method of transmission. Not only was it required for transmission, it was the method by which students retained works. Their goal was not only to repeat them, but to be able to recall their sections in different orders. In short, they needed to be able to grasp texts entirely in memory. This was not just a matter of study, but played an integral role in rhetoric, the face-to-face public presentation and argumentation by which political and legal questions were settled and by which ceremonies were played out. All of this is true, but it neglects what is perhaps most telling: what enabled the art of memory to work and to work well.

Francis Yates provides accounts of the mnemonic feats of the classical period:

*We think of memory feats which are recorded of the ancients, of how the elder Seneca, a teacher of rhetoric, could repeat two thousand*

<sup>18</sup> Illich, Ivan. *The Vineyard of the Text*, 54

<sup>19</sup> Yates, *The Art of Memory*, 31.

*names in the order in which they had been given; and when a class of two hundred students or more spoke each in turn a line of poetry, he could recite all the lines in reverse order, beginning from the last one said and going right back to the first.<sup>19</sup>*

This in itself seems to us mindless, it fails to distinguish between grasping in totality and parroting rote. But, the role of memorization in antiquity reflects some underlying characteristics which we can observe. Cicero's *De Oratore*, book III will suffice. Cicero's writings on rhetoric, speaking effectively and convincingly, belongs to a Greek tradition. He is one of a handful of authors who serve as authorities on rhetoric through the middle ages. *De Oratore* is organized as an inquiry and didact between Cicero and his son. Here is an early exchange on the nature of evidence:

C. JUN. *What is an argument?*

C. SEN. *A plausible device to obtain belief.*

C. JUN. *How then do you distinguish between the two kinds of arguments you speak of?*

C. SEN. *Arguments thought of without using a system I term arguments from outside, for instance the evidence of witnesses.*

C. JUN. *What do you mean by internal arguments?*

C. SEN. *Those inherent in the actual facts of the case.*

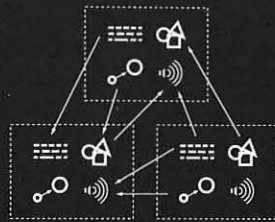
C. JUN. *What kinds of evidence are there?*

C. SEN. *Divine and human. Divine evidence is for instance oracles, auspices, prophecies, the answers of priests and augurs and diviners; human evidence is what is viewed in the light of authority and inclination and things said either freely or under compulsion — the evidence that includes written documents, pledges, promises, statements made on oath or under examination.*

C. JUN. *What do you mean by internal arguments?*

C. SEN. *Those that are inherent in the facts themselves, [sometimes derived from the whole, sometimes from parts, sometimes from their designation, sometimes from things in some way related to the point under investigation and to the whole of the subject under discussion; sometimes definition is employed, sometimes enumeration of the parts, sometimes etymology...]*

While this is a methodical description, it lacks a sense of system or hierarchy. We see an undifferentiated pile or list. There may be containers: authority, empirical fact and



### Hypermedia

Hypermedia is the combination of multimedia presentation and hypertext navigation. The challenge is in the selection among media for different aspects of the communication, and the use of the expanded set of tools to provide for the orientation that hypertext alone lacks.

necessity, opposition and similarity, but one does not have a sense that these are clearly ordered by a larger discourse that defines the relations between them. For instance, do we know if this is an exhaustive set? Without a theoretical structure, we cannot know. Authorities rather than logic define the set.

Within the writings of antiquity, systematization is sometimes if not often at issue. We would need an underlying set of concepts to bring the concepts under discussion under a common organizing principle. Once we know such a principle, we do not need to memorize the concepts we are discussing, because they are implied by the theory.

Within this tradition, the notion of image, on the other hand, has a fundamentally theoretical cast. Aristotle approached the problem of image in this way:

*Aristotle's theory of memory and reminiscence is based on the theory of knowledge which he expounds in his De anima. The perceptions brought in by the five senses are first treated or worked upon by the faculty of imagination, and it is the images so formed which became the material of the intellectual faculty. Imagination is the interme-*

*diary between perception and thought. Thus while all knowledge is ultimately derived from sense impressions it is not on these in the raw that thought works but after they have been treated by, or absorbed into, the imaginative faculty. It is the image making part of the soul which makes the work of the higher processes of thought possible. Hence 'the soul never thinks without a mental picture,' 'the thinking faculty thinks of its forms in mental pictures,' no one could ever learn or understand anything, if he had not the faculty of perception; even when he thinks speculatively, he must have some mental picture with which to think.<sup>20</sup>*

<sup>20</sup> Yate, *The Art of Memory*, 32.

The notion of image or mental picture here is very much like our notion of theory: it brings together the various things we are looking at in a clear set of relations and that is its key to memory and to thinking. In our time, we would say that by bringing a set of facts or concepts under a single theory we can determine their extent, how they are related to each other and with a new concept we can relate them to other things in the world. The Art of Memory provides intelligible structure by its semantic and diagrammatic visualization.

One obvious but perhaps confusing difference between modern thought and what we see in the art of memory comes out of different cultural beliefs about the sources of knowledge. Our sense is often that we build new theories or ideas out of the facts that we collect. If we are asked what a computer is, we begin by examining it. But this belief is always borne out in practice. Our understandings of computers, for example, are shaped by myriad metaphors, or models defined elsewhere that we apply in order to interpret. Similarly, words grow by developing new figurative uses by which we understand new situations through comparisons with older ones: "I *dropped* the board." "I *dropped* the class."

Nevertheless, the notion of ordering in pre-modern texts has less the sense of organic internal relation than it does for us, and very often the sense of the order strikes us as being imposed from the outside, as well as being visual. The sources of knowledge in these texts are more often based on speculation and authority than on experiment: the ancient world is static, and it is one dealt with on the basis of limited knowledge. There is, thus, a tendency to build down structures of signification from that which is constant and believed to be essential, particularly religion, astronomy, metaphysics and

those structures as interpretive tools. A secondary tendency to see the concrete and the essential one through it. This tendency is peculiar to Greece and to Rome. Within the tradition this tendency shifts in a number of stages. The work of Jacob Matham shows us the cusp between the world as interpretation and as observation.

The inscription suppresses the conventional hyperbolic formulas used by Screvelius. It designates the animal a sperm whale, rather than the more common monstrem. Van Mander's subtext is an attack on publications such as a booklet on the whale stranded at Berkheij in 1598, that take the whale for a portent demanding interpretation. In conjunction



Jacob Matham, The Whale stranded at Wijk aan see. In Küchler, Suzanne and Walter Mellion. *Images of Memory*. Smithsonian, 1991.

with Van Mander's views, Matham's prints illustrate the dual possibility of pictorial description and neutral beholding. The Beached Whales of 1598 and 1601 alert us to the distinction between observation and interpretation; they apply Golzius' burin-hand in order to enrich description, making enhanced appeal to the beholder's receptiveness to visual information. Their polemical purpose is the stripping away of what we might call the hermeneutic impulse, which they supplant with an epistemological one. The substitution of wonder at God's artifice for the anxiety to divine his intents.<sup>21</sup>

<sup>21</sup> Küchler, Suzanne and Walter Mellion. 1991. *Images of Memory*. Washington D.C.: Smithsonian, 21.

If we filter out those cultural aspects of the ancient and medieval world, we can recognize a contemporary counterpart to the mapping of the Art of Memory in graphic design. Like the art of memory, graphic design is often diagrammatic, mnemonic, semantic and rhetorical. Visual design as we know it uses a variety of rhetorical devices to contextualize, organize and symbolize, creating the potential for visual conceptual structures. It makes reference to concepts through the juxtaposition of concrete entities. When we look at graphic design in this way, it bears a closer resemblance to the mnemonic and interpretive images of the ancient and middle ages than it does to the art that comes later. Unfortunately, much design, particularly on the web, shows little if any conception of that diagrammatic function, opting solely for the expressive.

#### The utilization of diagrammatic structures

To summarize, one aspect of the Art of Memory is the use of external structures to systematize material. These structures may seem unrelated and arbitrary to us, and they may seem overly tied to authoritarian or rote systems of knowledge, but once understood, it is clear that they perform familiar and contemporary functions: 1) to provide concept mappings of the varied items under inspection, and to transform them from a collection into an interrelated system, 2) to give that system a unity or identity so that it can be discussed both by analysis, and with reference to other systems or objects, 3) to provide for the significance of that system in a larger scheme of things, 4) finally, by presenting images, ideas are given unity in a clear and concrete tangible existence. These four aspects support the more general approach of creating memorability through intelligibility.

#### Application

According to Walter Mellion and Suzanne

Küchler:

*What has yet to be attempted is an account binding mnemonic functions to processes of representation. While Yates refrains from asking what is involved in the translation from mental images to pictures artficed by the hand, Bartlett and other cognitive psychologists leave ambiguous the place of images in the formation of the schemata that organize memory.*<sup>22</sup>

<sup>22</sup> Küchler, *Images of Memory*, 4.

Part of the goal here has been a linkage between visual form and concept. It is not by any means a definition of intelligibility as a whole which refers to the total setting of a piece of information or a communication including the social setting or exchange in which a communication takes place, its relationship to the sender, to the receiver, and to the activity in which it participates, or to larger social and cultural issues. It can be a non sequitur on any or all of these levels.

The user's sense of intelligibility in terms of navigation and orientation with which we began is really a diagnostic used when we cannot understand what is in front of us. At the same time, our orientational sense of size and structure, and our understandings of navigational strategies need only have an oblique relationship to the "actual" structures behind the screen; we drive confidently when we think we know where we are going, even if we are surprised to find out where we go. The Art of Memory demonstrates our need for conceptual/material identities by which we can order our experiences, even if those identities are arbitrary, and it demonstrates the ability of visual media to encapsulate conceptual identities and the interrelations that comprise them.

Within existing forms, our need for orientation is reduced because we bring the mental images and expectations that make navigation and orientation possible. Both as readers and as creators, we know what novels, essays, newspaper articles and advertisements are: we know how to indicate orientation and navigation and how to read them.

The Art of Memory, provides us with a different perspective on visual tools and some of the goals for intelligibility within new forms. Critical issues include: presenting the whole as a concept or identity, disclosing structure as an interrelation of parts, making the links visible, disclosing the qualities of the links, indicating hierarchy.

Within pre-existing forms, the relations between visible signs and their significances are clear while in new situations they will not be: for example, page numbers that make sense in books, but seem inexplicably useless in computerized books. Thus, sign and symbol systems that worked in old forms will not necessarily work in new ones, not so much because of inherent differences of media as due to the lack of symbolic culture.

Most important, it indicates that visualization is more than a matter of decoration, and that it is important to understand visualization and particularly visual rhetoric as integral to communication content. Unfortunately, much of the research and writing devoted to interpretation is medium specific (literature studies about texts, deconstruction of images). False dichotomies are often drawn separating the media. Mixed media are not new, but in the new computer environment mixed media are becoming the rule. The Art of Memory indicates that visualization need not be looked at as something external or less important than text or words.

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