
Hypertext, Hypermedia, and the Humanities

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ABSTRACT

HYPertext/HYPERmedia SYSTEMS in the humanities have evolved significantly in the last decade and particularly since 1985. The writings of humanist scholars are important in understanding the use of this comparatively new medium for information access and use. Hypertext/hypermedia applications in the humanities show significant promise for the future but may also present libraries with special problems. This article provides historical background on hypertext/hypermedia; focuses on their use in the humanities; describes humanities projects that illustrate trends and techniques; discusses libraries' roles in hypertext/hypermedia humanities computing; and concludes with a description of challenges and opportunities as librarians implement such systems.

DEFINITION AND BASICS OF HYPERTEXT AND HYPERMEDIA SYSTEMS

The precise origin of *hypertext* is not entirely clear. Ted Nelson (1987) claims that he coined the word about 1967 (p. 0/2); Kahn (1990, p. 80) traces it to a conference presentation by Nelson in 1965. But Van Dam (1988) notes that he was also working with the concept in 1967 and traces it back to Douglas Engelbart in the 1950s. Engelbart is said to have reported on his Stanford research on workstations for browsing text at a conference in 1968 (p. 164). Nelson also acknowledges Engelbart's contribution as inventor of electronic text systems. Nevertheless, it is Nelson himself, particularly in his "Project Xanadu" (dating from 1960), who has drawn most attention to issues

of a shared pool of information that can be accessed nonlinearly, and Nelson was a prominent and fervent advocate of hypertext for several decades before it achieved wider popularity.

Nelson's (1987) definition of hypertext as *nonsequential writing*—"text that branches and allows choices to be made, [and] is best read at an interactive screen" (p. 0/2) serves us well. Hypertext systems can include sequential text but their real strength lies in allowing users to move through text by selecting from a series of links among information nodes, rather than forcing a linear approach that provides little opportunity for individual variations in thinking or, for that matter, writing. Bevilacqua (1989a, p. 159) defines *hypertext* as nonsequential text in which users can link associated information and *hypermedia* as linking various document formats. Shneiderman (1989) describes it as part of "a large body of information organized into numerous fragments, [in which] the fragments relate to each other, and, the user needs only a small fraction at any time" (p. 115). A more technical definition (Rada, 1989) would be of a "Textbase + a semantic net + tools for creating and browsing this combination of text and semantic net" (p. 164). Atkinson, developer of Hypercard, called it: "A software erector set" (quoted in Harris & Cady, 1988, p. 33), a description that some now apply to hypertext in general.

Contemporary definitions blur the concept by including the word "multimedia." Since the 1980s, various innovative equipment, reflecting the dynamism of this still relatively new field, have compelled a reshaping of the original hypertext definition to include nontext resources. Nelson (1989) has enhanced his original definition to include "text, graphics, audio and video [that] can now come alive in unified, responding, explorable new works that present facts and ideas: hypermedia" (p. 3) (known also by such other terms as "interactive-multimedia"). Although expansion of the term is not without complications (e.g., possible incompatibility of systems based on different media, Nelson (1987, p. 0/3) believes that it offers the advantages of openness and pluralism of information. Gaines and Vickers (1988, p. 4) warn that terms such as "hypermedia systems" may lose their meaning if overused before they are well defined. Others (Bevilacqua, 1989a) suggest that these terms will gradually replace "hypertext," since, "in a digital world, sound, text and images are all represented by the same binary signals and microcomputers are evolving to take advantage of these new capabilities" (p. 158) even as some (Heid, 1991) see it as "the victory of sound bites and flashy visuals over the printed word" (p. 225).

This expansion of the scope of hypertext may lead to an expansion of our ideas on what constitutes "reading and writing"—to include access to and use of graphics, sound, moving images, and other

formats. Nelson's augmented definition refers to "reader-controlled links" (quoted in Bolter, 1991, p. 105)—users should be able to create an individualized system by including their own links and nodes—which implies that such systems should allow users to gather segments from varying contexts and formats, by freely moving among them, and to store them for later re-use. "Hypertext" and "hypermedia" both refer to systems that "support manipulation of and access to structured information," but such terms as "hypermedia" highlight the multiformatted aspects of modern information systems (Irish & Trigg, 1989, p. 192). The idea of what constitutes a "book" could undergo a transformation to include an electronic product containing text and images through which the "sender" can transform the plot into a multimedia production by moving among various story elements without relying upon a linear movement. This can now take place on a home television screen, rather than a microcomputer, which confirms Bailey's (1990) prediction, that "new computing technologies will quickly evolve and converge, creating hybrid computing systems from the cross-fertilization of previously discrete products and research areas" (p. 30).

To simplify further discussion in this part, the term "hypersystems," will be adopted to refer to all systems of this general type. The result of the implementation of hypersystems would be a

seamless computing environment where the user, at will, could assemble and link materials from different storage media and from different sources to create individualized knowledge bases (or "ideabase"). (Beck & Spicer, 1988, p. 23)

DEVELOPMENT OF HYPERTEXT/HYPERMEDIA

It is only in recent years, since 1985, as Carlson (1989, p. 59), Harpold (1990), Scacchi (1989, p. 183) and others note, that there has been an explosion of interest in the development of hypersystems. Publication of Bush's (1945) "As We May Think," commonly regarded as the foundation for the development of such systems, stimulated few immediate responses. As Harpold (1990) documents, very few writers elaborated on Bush in the period 1945-1975, interest picked up in 1975-1985, and the literature on information systems of this general type has exploded since 1985. Moreover, the literature no longer focuses exclusively on technical issues but also addresses such concerns as the "epistemological, philosophical and sociological consequences of hypertext" and "the consequences of this new form of literature as a new literary form" (Harpold, 1990).

HUMANITIES AND HYPERTEXT/HYPERMEDIA OR HYPERSYSTEMS

Background

Although there were a few early and successful humanities hypertext efforts, it was not until the late 1980s that the subject became a part of the humanities computing vocabulary. Publications about humanities computing illustrate this trend. For example, a guide to the use of computers for humanists published at the start of the 1980s was entirely text oriented and focused on developing word indexes and stylistic analysis (Hockey, 1980) and manuals on computers in humanistic studies (Tannenbaum, 1988; Kren & Christakes, 1987) did not include the topic. Most of the proceedings of humanities computing conferences in the 1980s lacked references to hypertext concepts: the International Conferences on Computing in the Humanities in 1977 and 1982 (Lusignan & North, 1977; Bailey, 1982) concentrated on textual, linguistic, and stylistic analysis and computer assisted instruction; the 1986 Toronto conference on "Computers and the Humanities" focused on using computers for text analysis, databases, and similar topics (Centre for Computing in the Humanities, 1986); and an international conference on *Computers in the Humanities and the Social Sciences* held at Cologne in 1988 (Best et al., 1991) showed that hypertext concepts had not yet penetrated the disciplines deeply; papers presented made no mention of hypersystem concepts.

The first volume of the essential *Humanities Computing Yearbook 1988* (Lancashire & McCarty, 1988) included few hypertext projects or applications in the humanities although publication in itself demonstrated growing interest in the application of computers to humanistic issues. A comprehensive survey of the literature of multimedia (Chen, 1989b) includes citations to applications in the humanities but few in comparison to those on the technology itself or to applications in science and engineering.

The comparative paucity of previous information makes two 1987 conferences stand out. "HyperText '87," a multidisciplinary conference at the University of North Carolina (*Hypertext '87*, 1987), included path-breaking papers on hypertext and creative writing, on nonlinear thinking, and hypertext's use in specific information applications of appeal to humanists. Coming shortly after the introduction of HyperCard, these applications also seemed completely feasible. The "Annual Conference on Writing for the Computer Industry," while it focused on writing and documentation, also included hypertext and other electronic techniques. Although intended primarily for the technical community, as in Herrstrom and Massey's (1988) concept of creating documentation for system end-users, such applications as

the use of hypertext to teach writing within object-oriented hypermedia environments were widely applicable to the humanities as well. Rapid publication of the proceedings of the conference (Barrett, 1988) helped to make hypersystem ideas more widely known in the humanities.

Hypersystems quickly became part of humanistic computing after 1987. The *Humanities Computing Yearbook 1989-90* (Lancashire, 1991), in contrast to the 1988 volume which had evaluated various hypersystems in just a few pages—with many citations to articles written outside the humanities at that—included numerous index references to hypersystems and other specific products or applications in the humanities. At the 1988 Modern Language Association Convention, just two sessions dealt with hypertext/hypermedia (Doland, 1989, p. 6), but within two years it was possible to say that “the conference circuit is now liberally sprinkled with hypertext sessions...” (Baird, 1989, p. 1). Launching of the periodical *Hypermedia* in 1989, with an introduction by Nelson (1989) himself, also acted as a stimulus and signified, through its publication in England, that the technology had become truly an international phenomenon.

Later publications served as guides to the applications of hypersystems in the humanities and were important in the change process. This second volume edited by Barrett (1989) included the application of humanities concepts, mainly derived from literature, within the context of technical writing and the synthesis of the three roles of writing, management, and engineering. Increasingly, general texts such as Nielsen (1990), a thorough and comprehensive summary of research and design issues with a fifty page bibliography supplementing his earlier work (Nielsen, 1989), Jonassen (1989, 1990) for the educational community, and general reviews of the state of the art (e.g., McAleese & Green, 1991) also became available. Similarly, the new *Hypertext/Hypermedia Handbook* (Berk & Devlin, 1991) will include chapters on the use of hypersystems in a variety of humanistic settings.

Books with a focus on the use of hypersystems specific to individual humanities disciplines, increasingly for an international audience clearly captivated by the potential of the new technology, are becoming available (Ambron & Hooper, 1988, 1990; Gloor & Streit, 1990; Delany & Landow, 1991) as well as others in which hypersystems are prominently represented (Miall, 1990a). These activities are echoed in recently scheduled conferences: Oxford University in May 1991 on “Hypermedia and the Humanities” (Hypermedia, 1991) which, perhaps as a sign of how fast the medium has progressed, included a contribution on “The LEGO-kit Approach to Hypermedia”; a second, “The Social Creation of Knowledge: Multimedia and

Information Technologies in the University” also scheduled for May 1991 (Social, 1991) showed the continuing leadership of institutions in the Northeast in this area; and a third held in Norway in October 1991 on pictorial arts, including hypermedia in museums, that noted the potential of multimedia for enhancing analysis (Hofland, 1991). These books and conferences are important indicators of the future of hypertext/hypermedia and provide both the theoretical and practical underpinnings for the application of hypersystems.

Hypertext's Appeal

The increase in humanistic interest in this new technology may be attributed to its intellectual appeal as well as to technological developments that have enhanced its potential for less technically skilled users. Promoters of hypermedia attracted attention by appealing to information needs and current interests in the humanities. Some made heady promises indeed: “A hypertext system could automate much of the work, allowing the scholar to have flexible access to vast amounts of data stored on optical media” (Crane, 1987, p. 54). Hypermedia techniques offered the capability to allow rapid access to large quantities of information through the creation of explicit links that enhance access—an “enabling device rather than directive environment, offering unusually high levels of learner control,” and they have the potential to alter the roles of teachers and learners (Marchionini, 1988a, p. 9). They offered easy nonlinear access to integrated information that could be responsive to a variety of skill levels and unrestricted or free access to information from many different perspectives (Duchastel, 1990, p. 222). Appeals were also made from an aesthetic standpoint: “[L]ike poetry, prose, mime, theatre, sculpture, painting, dance, or music, this technology empowers and constrains creators and users in unique ways” (Marchionini, 1988b, p. 7).

Promises were not the only stimulus. Evidence emerged from cognitive psychology that “individuals ‘learn’ by augmenting, combining, and rearranging a collection of cognitive maps, many of which are overlapping and most of which are interconnected through a complex network of associations” (Carlson, 1990b, p. 18). Since two individuals would have dissimilar associations and would view information differently, flexible information systems—what hypertext promises—would model learning processes. Hypertext, through its principles of building information nodes and interrelating them through connectors or links, offers a way of imitating these individualized learning behaviors (Jonassen, 1988, p. 13). In addition, it was believed that less experienced readers remain locked into the sequence of the printed text while experienced readers develop a more

complex linking of information or "text web" (Carlson, 1990b, p. 18) which hypertext emulates. Multiple options permit users to determine which paths to follow and how to find and use information (Jonassen, 1986, p. 270). Findings of other studies (Stone, 1982) also show that hypertext systems could appeal to humanists' inclinations toward individual study and their serendipitous interaction with materials through browsing. Such reasoning from the scholarly world supported the claims of hypertext enthusiasts for using nodes and links in presenting information.

Another idea about hypertext—that echoed Nelson's Project Xanadu and his great world of information and shared documents—was that it would enhance cooperation and collaboration and mimic what were perceived to be Japanese competitive organizational strengths. Hypertext could enhance interaction through idea webs, an objective endorsed in such concepts as quality circles in which communication is an important part of the process as opposed to the solitary activity of reading books (Carlson, 1990b, p. 28).

There were other significant technical developments as well. Although the interactive videodisk is not inherently a hypermedia product (Howlett, 1986, p. 40), it can display images frame by frame and incorporate two separate sound tracks. It attracted early attention for humanistic teaching, as in vivid images of a mythical town in Mexico (Gale, 1983), and to teach languages (Schneider & Bennion, 1982). Descriptions of other uses quickly appeared and, as a recent note on methods of transferring 500,000 slides to videodisks showed (Brown, 1989), it is still an attractive technology. The introduction of a videodisk connected to a microcomputer or digital video interactive technology made its possibilities even more attractive (Morris, 1987) since images stored on a videodisk could then be accessed randomly and incorporated with text or other technologies.

During the 1980s, several institutions and research laboratories supported basic research into hypertext, among them the "NoteCards Project" at the Xerox Palo Alto Research Center (Trigg & Irish, 1987; Halasz, 1987); the commercially available "Guide" from OWL International, derived from a system initially developed at the University of Kent (Beck & Spicer, 1988); and "HyperTies" from Ben Shneiderman for a DOS environment, which has been in development, initially with the name "TIES," at the University of Maryland since 1983 (Shneiderman, 1987; Shneiderman & Kearsley, 1989). Despite many excellent features, these failed to win a wide user audience among humanists. Even systems, such as "Notes" developed at Carnegie-Mellon University (Neuwirth et al., 1987) and "WE" at the University of North Carolina (Smith et al., 1987) intended for humanist needs, or to focus on basic cognitive issues, did not seem immediately attractive.

In comparison, HyperCard became quickly and widely known among humanists after its introduction early in 1987. Its availability, ease of learning, backing by a major computer manufacturer, and capabilities for nonlinear progressions to nodes that could include images and sound, stimulated its applications in humanities areas. Within a year, HyperCard was being called "a milestone in educational computing" (Camp & Cogan, 1988) and humanists, as well as librarians, began to develop applications (Baird, 1988; Bevilacqua, 1989b; Ertel, 1989). Combining HyperCard with emerging CD-ROM and videodisk technologies was a natural progression into hypersystems.

The appeal of hypermedia systems based on HyperCard may actually be related to the way computing applications in the humanities have developed. Other than for some shared programming languages such as SNOBOL (Butler, 1985), a proliferation of diverse systems lacking compatibility dominated the field. There was little in the humanistic computing environment comparable to MARC standards for the library community. Volumes on humanities computing in the 1980s more typically described individualized applications than interchangeable tools and capabilities. HyperCard offered ease of use and compatibility which enabled humanists to share stacks, programs, and techniques with colleagues elsewhere throughout the world. Its international availability and comparative ease of manipulation broadened the hypersystem user base.

Institutional Activities

During the 1980s, several institutions developed hypertext systems specifically for the humanities. Dartmouth College, under contract from Apple Computer, tested an early version of HyperCard and showed its applicability to a variety of humanistic uses—e.g., its "Mnemosyne Project," in which the videodisk of the National Gallery of Art was enhanced by a HyperCard front end that made it possible to access the 1,645 paintings and prints as well as information about individual artists and works (Beck & Spicer, 1988, p. 24; Lancashire, 1991, p. 15). As an added incentive to other humanistic projects, the report of the Dartmouth project emphasized HyperCard's ease of learning in comparison to other hypertext programming languages.

Under the auspices of the Institute for Research in Information and Scholarship (IRIS), Brown University's "Intermedia Project" also emerged as a prominent hypersystem application with implications for the humanities (Ess, 1990). Intermedia, which originated in the 1960s on a mainframe computer accessible from other university sites (Van Dam, 1988), made possible the linking of visual and textual resources with windowing and multiple simultaneous document

capabilities. It was originally intended to "show what that operating environment should be like" (Kahn, 1990, p. 81) in providing object-oriented, direct manipulation, and linking of information nodes. Intermedia deals with two difficult problems in instruction—"the *connectivity* of materials and the *visualization* of concepts and ideas" (Beeman, 1987, p. 71) and provides a consistent user interface with links between specific points as well as among documents. It was applied first to the teaching of an English literature survey course (described later) and a plant cell biology course (Beeman, 1987, p. 71; Lancashire & McCarty, 1988, pp. 361-62).

EXAMPLES OF HYPERSYSTEM APPLICATIONS IN THE HUMANITIES

Listing all active or proposed humanities projects that employ hypertext/hypermedia techniques is beyond the scope of this survey (e.g., Lancashire & McCarty, 1988 and Lancashire, 1991 offer excellent lists and descriptions) and some fields in which advances were made, such as religious studies (DeRose, 1991), were excluded due to lack of space. The present survey reviews selected fields, suggests the diversity of humanistic approaches, and provides a context for subsequent discussion of these projects within library services. It employs somewhat arbitrary categorizations.

Art and Archaeology. As Martlew (1990) noted, "archaeology is a very visual subject [in which] lecturers often use the image as an *aide memoire*, rather than consulting notes" (p. 43). Therefore systems that efficiently incorporate images with texts and search them effectively seem ideal for art and archaeology applications. Scholars in these disciplines are unlike scholars in fields that depend on a corpus of texts; they rely more on the ability to establish connections among images (Harward, 1988, p. 16). Without the ability to access two art works simultaneously, difficult in such cases as the Parthenon's dispersed sculptures for example, an "authentic" comparison is impossible. Hypermedia makes it possible to access separate images randomly, examine them simultaneously, and even combine them in comparative ways that would be impossible even using the physical objects themselves. Hypersystems might thus supplant or supplement large, difficult to manage slide accumulations derived from multiple sources.

The National Gallery of Art application (see earlier discussion) makes use of videodisk technology with a HyperCard front end that includes access by period and genre with interactive searching capabilities by painting or artist. Other related applications include an "interactive encyclopedia system" (Shneiderman et al., 1989, p. 172),

tested in an art museum, which, although not entirely a success, demonstrated that “computers can contribute to an exhibit by offering an engaging, interactive, and personal experience” (p. 181). Schneiderman et al. also note, in a caution that librarians should take account of, that designing for museum patrons is difficult because user characteristics vary significantly (p. 182). The popularity of an application at the Getty Museum in California demonstrates that technology can be almost as appealing as art, and a University of Wisconsin-Madison project uses software called ARTSearch to directly link computer data to visual images of textiles stored on a videodisk (Femenias & Mansfield, 1986a, 1986b).

Other projects demonstrating international appeal include an interactive project in Dublin (Hastings, 1986); an Italian government videodisk on that country’s art, archaeology, and cultural history—termed the “national photographic archive” (Bartolozzi & Chen, 1987); and Project Emperor I, which combines art, history, and archaeology in examining, through a multimedia Macintosh application, clay statues located in a tomb in China (Chen et al., 1988; Chen 1989a). Several, for example Project Perseus described later, have combined images with extensive textual data and function as tools of scholars in several disciplines simultaneously. The description of Project Emperor notes, in a comment applicable to all such developments, that hypermedia might first be thought of as an educational device, but its ability to access images located at a distance melds that function with research (p. 11).

There is also a blending of disciplines. Project Athena, which originated at MIT, was a large-scale attempt to explore computer use, but the techniques employed were used at the University Museum of the University of Pennsylvania as part of the curriculum of the Department of Classical Studies (Romano, 1989; Davis, 1988; Hodges et al., 1989, p. 79). As part of a course, students used Project Athena’s techniques and data to experiment with the development of an ancient city.

There are also attempts to explore basic artistic levels for use in teaching. For example, a videodisk with a HyperCard front end deriving from Josef Alber’s *Interaction of Color* (Phelan, 1988; Whiteley & Roberts, 1990), promises to revolutionize color theory in the same way his book did when first published. Other efforts are being made to use hypersystem techniques in art education (Dyer & Milner, 1990).

On another level, archaeologists note the dichotomy between archaeological technology and the use of printed formats to disseminate information: “Changing information technologies have reshaped the ways archaeologists collect and analyze data” (Smith,

1990, p. 1). The resolution of this dialectic may lead to significant changes in information dispersion in art and archaeology that will have meaningful implications for libraries trying to develop collections and provide information.

Classics. Perhaps the leading example in this field is the "Perseus Project" (Crane & Mylonas, 1991), which originated at Harvard University as a text base derived from scholarly sources that made available in one place approximately 10 percent of all surviving classical texts. It was intended to be an educational device in which students could develop their own skills independently and build complex intellectual models of their own (Crane & Mylonas, 1988, p. 27) but one in which the instructor could exercise control over content and sequence. It can be used to teach courses in Western civilization, archaeology, and related fields such as philosophy and political science that use ancient Greek texts as sources. In its hypersystem implementation using HyperCard on a Macintosh linked to videodisk and CD-ROM, Project Perseus (Crane & Mylonas, 1988, pp. 25-26; Harward, 1988) allows a reader of a Greek play in either Greek or English to locate "references in other texts, see visual representations, and relevant place names on a map, look up Greek words in a dictionary, and read the encyclopedia entry." The user can access line outlines of buildings or, from the videodisk, photographs of archaeological sites. Its derivation from reliable scholarly texts combined with visual materials contributes to its strength (Harward, 1988, pp. 18-19). A reviewer (Hughes, 1988) although not entirely satisfied, noted that it helps "bridge the gap between disciplines for students, as well as for teachers and researchers, and [enables] users to view the classical world as a whole" (pp. 1-2). It is a product that relates directly to the scholarly needs of those interested in the classics since it is textually based yet provides a means of accessing related information that enriches the understanding of those using it.

History. Historians have long been attracted to computer programs that promised to mimic actual historical events. As early as 1968, the famous French historian Le Roy Ladurie had predicted that "tomorrow's historian will have to be able to programme a computer in order to survive" (quoted in Woods, 1982, p. 229). For the most part, however, historians have found available programs to be either inflexible or insufficiently comprehensive to meet scholarly needs.

The "Project Jefferson" interface, developed in 1987/1988 at the University of Southern California, was intended to be "an innovative teaching library" (Chignell & Lacy, 1988, p. 43); to access online

and other sources through the use of a "resource icon [that] directly invokes the online access program and establishes connection with the remote system" (Kinnell, 1988, p. 35); to serve as a model of computer-based instruction using a standard interface applicable to other disciplines; and to encourage students to acquire writing skills using ethical issues arising from study of the U.S. Constitution (Kinnell, 1989, p. 34; Chignell, 1988, p. 12). Although largely intended to teach writing and research skills, the approach that it took, a variant of the Macintosh "Desktop" metaphor, was to include linkage between, for example, an encyclopedia entry and bibliographic citation together with a mechanism for saving personal materials and creating additional links. Project Jefferson also provided a self-pacing device that made it possible for students to establish their own sequence of learning. It was also notable as one of the few projects to be a combined effort that included librarians along with scholars and technologists.

In England, the BBC's interactive videodisk "Domesday Project," named after a survey of the country carried out in 1086, was intended to be a replication covering contemporary England. It included text, maps, and graphical images. A user could interact with the images stored on two laser disks through the use of a "tracker-ball" that operated an on-screen pointer. Overall, despite some caveats, the Domesday Project was a success. In the opinion of two reviewers, interactive video was an "interesting, stimulating and novel way of learning and absorbing information," even though the reviewers were not convinced that it would actually make learning easier (Noble & Hargreaves, 1987, p. 245).

Culture 1.0, a HyperCard product that claims to provide information on all aspects of Western civilization from its origins to contemporary times, stands out as an example of the challenges involved in creating historical projects. It uses scanned images, the capability of HyperCard to produce musical notes, and clever linking and orientation devices to lead the user through diverse information. But a comparison with even basic reference works found in most libraries by this writer (Welsch, 1989) or by another librarian otherwise favorably disposed toward *Culture 1.0* (Heise, 1991), showed that it covered most historical topics superficially and, a key element for historians, failed to include full citation to materials making it impossible to derive information about source origins.

There are other commercial products, particularly games involving combat in past wars. Scholastic Software's "Point of View" is intended for a high school audience and is open ended since it provides capabilities for teachers to add visual materials from videodisks or audio materials from other sources. Although not

technically a HyperCard application, it uses the point-and-click features of that program, enabling students to move easily among segments. But one review noted problems with the documentation—particularly the lack of full citations to the materials—which would annoy teachers, as well as some technical glitches which would trouble users (Markowitz, 1990).

For historians, with their emphasis on the use of soundly based texts whose origins are known, hypertext/hypermedia efforts have been only partially successful. Even though the discipline, with its frequent need to refer to external information, should be ideal for such applications, neither the journal *History and Computing* nor other sources suggest that this has been a productive applications area. Part of the problem is reliability. Unlike Project Perseus, which originated from scholarly sources, the use of incomplete or inaccurate sources would, despite the ease of use described for such products as *Culture 1.0*, make such efforts unsuitable for historical research or teaching. Just as libraries do not buy books because they have attractive bindings, alluring ways of maneuvering through stacks which lack content do not make products suitable either.

Language and Literature. There have been several ingenious hypertext/hypermedia applications in this discipline. It would be theoretically tempting, as a leading humanist computer user noted (Slatin, 1990, p. 124), to view hypertext as a postmodernist effort to replace the modernist emphasis on objects and order with another on processes and chaos as the foundations of reality, but applications are probably more prosaic in origin. Another prominent scholar stressed the importance of hypertext systems for literary studies because they can emphasize relationships and connections among texts that might otherwise be physically isolated and can alter the way that we perceive, understand, and experience texts (Landow, 1989a, p. 174), have the capacity to be anti-hierarchical and can lead to the disappearance of the boundaries between reader and text (pp. 185-86).

Brown University has hosted an ambitious effort to use hypertext/hypermedia in literature as part of its Intermedia Project. In the 1970s, there had been experiments with use of a full-text retrieval program called FRESS, developed by Andries Van Dam, for poetry courses at Brown. In one, an experimental course built around William Blake's "The Sick Rose," students were made aware of a surrounding body of text and encouraged to participate in the shaping of the material as well as being able to refer to related materials by simple command macros relayed to a mainframe computer (Catano, 1979). Describing that course in a work published almost a decade before hypertext

had become common, Catano (1979) of Brown found hypertext analogous to poetry since "individual poets constantly develop their meanings...by referring to that total body of poetic material of which the particular poems comprise a small segment" (p. 269).

In many respects, this project contained the essence of later work using hypertext in literature—multiple windowing; enjoyment of literature as well as development of critical abilities; student flexibility; movement "outward" from a bare text—random access to related texts and, in hypermedia systems, other materials as well; and the concept of a poem or other text as part of a "web of interconnected materials...[in which] each student could use the strands of the web to 'pull' other selected materials into the three remaining windows"(Catano, 1979, p. 270). Instead of the computer taking over or doing the instructor's job, it enhanced personal creativity, classroom dialogue, and poetry reading (Catano, 1979, p. 275).

In the 1980s another application, *Context32*, was developed as part of the Intermedia Project for use in English literature survey courses (Landow, 1987; Kahn, 1990, p. 82 and following; Lancashire, 1991, pp. 445-47). For example, a part of "The Dickens Web," a collection of about 2.5 million bytes of documents relating to the author and specifically to *Great Expectations*, was extracted for use in a complex but flexible mixed media assemblage. The object was to link literature to its contextual surroundings in historical and biographical data and, as the name of the project suggests, to provide the context for a literary work. More than a thousand information nodes interlinked by the same number of links include "overviews, biographical timelines, brief biographies, short essays about literary works...as well as graphical illustrations, all of it browsable by students" (Duchastel, 1990, p. 221). Observation (Beeman, 1987, p. 75) of the project in action suggested that the professor came into a less didactic relationship with the students, and that the students had more significant flexibility in determining the course sequence. But, as more than one source noted (Lancashire, 1991, p. 446), copyright has been a restricting factor in deciding which texts to include.

A project to illuminate Shakespeare's dramas at Stanford University took a different approach derived from a faculty member's frustration in talking about something that was not there—the "real experience of theater: communal, sensual, hallucinatory, fleeting as a dream" while studying the plays of the most prominent English playwright (Friedlander, 1988, p. 26; Friedlander, 1991). As *Context32* at Brown had sought to put texts into their literary background, the issue of framework was significant since, regardless of the richness of the texts, they were being studied outside of an acting context

that would add to their understanding. The result was "The TheaterGame" which uses a HyperCard front-end on a workstation with a two-screen monitor, a videodisk player, and a video monitor. In a sense, the project encourages students to explore and create their own Elizabethan theater in the same way that Project Athena (see earlier discussion) encouraged students to create an ancient city. As did students in other projects, those at Stanford could maintain an electronic notebook of text or images for later presentation as a multimedia essay. The system's flexibility augmented learning.

The use of hypermedia for literary study has not been confined to universities. Robert Campbell (1989) used John Steinbeck's *The Grapes of Wrath* in a public school environment. Using hypertext links on a Beta test version of HyperCard integrated with a videodisk machine, students were able to find illustrations from sources such as posters, videotapes, audiotapes, and books that related to the text. Two other instructors (Harris & Cady, 1988) used HyperCard in a secondary school to develop a tool for enhancing Poe's short story "The Masque of the Red Death." Although an early implementation of HyperCard, the teachers thoughtfully included a "tracking device" that made it possible to evaluate student progress and activities. Another proposal was for developing model stackware for use of HyperCard to embellish the poem by Edna St. Vincent Millay, "Justice Denied in Massachusetts" (Vandergrift, 1988). Since the poem alludes to the trial of Sacco and Vanzetti, reinforcing the text with illustrations and other information was a natural enhancement for schools. Recent publication of a manual intended for pre-college students (Franklin, 1990b) is likely to reinforce this trend. Augmenting textual materials with contextual materials is important as schools continue to address the question of how they will use computers as part of current curricula, but their use may also evolve into cultural or "hyper-environments" for learning (Cumming & Sinclair, 1991, p. 325). If this trend does spread and establish itself, students will have altogether different learning expectations of their institutions and libraries than those of previous generations.

Even before the advent of HyperCard, interactive videodisks were being used for teaching languages in the United States and abroad (Branvold et al., 1986; Fletcher, 1987). With point-and-click random access hypertext systems that enable a student to progress at individualized speeds and to hear a native speaker pronounce a word as it is clicked—e.g., a Cantonese pronunciation guide on HyperCard (Leung, 1989); another for Hanzi characters (Bantz, 1990, pp. 36-37)—the system is even more appealing. Access to external multimedia sources suggests that teachers have "just crossed over into a new generation in the creation of language-learning materials, one that

might be called the Age of Hypermedia" (Underwood, 1988, p. 13). The addition of hypermedia, in Underwood's (1988) case a Spanish language course derived from a British soap opera, makes it possible to increase student involvement and engage the student actively in the learning process (p. 17). In addition, there have been attempts to use hypertext techniques to enhance access to dictionaries. The new *Oxford English Dictionary* has been the focus of several researchers (Raymond & Tompa, 1987) who developed prototypes for access, but one pair found it a good example of a text that was initially developed with little thought for computerized access (Watters & Shepherd, 1991, p. 60) and therefore presents special problems.

Finally, a more complex idea about interactive creative writing and hypertext has emerged and interacted with conceptions of technical writing and online documentation (Harris & Cady, 1988; Yankelovich et al., 1991; Bolter, 1985; Bolter & Joyce, 1987; Bolter, 1991; Moulthrop, in press, cited in Harpold, 1990). It is based on the idea that a true hypertext system allows for true human interaction with the resources: since hypertext systems closely model human idea processing by creating a network of nodes (modules) and links (webs), they allow for "three-dimensional navigation through a body of information" (Carlson, 1988, p. 95) and thereby enhance both creative writing and system documentation (Carlson, 1988; Slatin, 1988; Brockmann et al., 1989). Through interaction with hypertext systems, the user can, usually through the creation of "notebooks," extract information and create individualized links to the system to enhance learning. As Irish and Trigg note (1989, p. 192), this concept incorporates two streams from computer science—hypermedia and "computer supported cooperative work."

In the literary realm, hypersystems could foster collaborative creative writing. Multiple authors on a college campus (Slatin, 1988) could create a hypertext, since authors could add to any section at any time, a literary process that somewhat parallels the emphasis of some twentieth-century poets on nonlinearity. A complex form of hypertext within a literary context used a system for interactive fiction called *Storyspace*[™] which follows a pattern suggested by short stories of the Argentinian author Jorge Luis Borges (Bolter & Joyce, 1987). His *Ficciones* consists of a series of short pieces of information without much of a plot (Bolter & Joyce, 1987, pp. 45-46), a characteristic inherently similar to hypertext applications. Hypertext relates to other aspects of postmodernist writing and to literary and semiological theory that have profoundly affected current literary research (Landow & Delany, 1991, p. 4). Yet other writers contend that hypertext may remain problematical as a literary device. Miall (1990b), although generally supportive of computer use, makes a key

point when he notes that "the central experience of literary studies cannot in itself be facilitated by the computer" since reading relates not only to intellectual demands made on the reader but also to the emotional responses to the materials presented in the text (p. 52).

Music. Two successful commercial productions using HyperCard as a front-end on Mozart's "The Magic Flute" and on the string quartet (Dunn, 1990; Eckhardt, 1991) have been widely accepted, and one, *Beethoven's Ninth Symphony* (Weiman, 1990), received the 1990 prize as MacWorld's commercial "SuperStack" of the year. They make it possible to examine musical works in depth and combine graphics with text and sound (Lancashire, 1991, p. 191). For opera, it would be similar to reading a synchronized libretto and commentary simultaneously with the opera. As commercial products, some works faced harsh criticisms such as "sloppy audio edits in some examples, typos, obscured text...[and] confusion when you try to start up" (Dunn, 1990, p. 267), but generally they have been useful in providing historical background and functioning as tutorials for beginners. A number of libraries have installed them to the delight of their users.

Among noncommercial applications, faculty members at the University of Delaware have combined videodisks with computer technology using IBM's "Info-Window," for music education (Peterson, 1991). Other developmental projects include "HyperBach," which combines themes with information about the works (Drone, 1988). The ability of multimedia systems, using HyperCard front ends, to capture sounds together with images and text and access them either sequentially or at random, makes these systems ideal for music uses and broader applications as well.

A combination of available technology, the desire to improve student access to information, the appeal of hypertext features in responding to pedagogic theories and demands, and some parallels between trends in the humanities and hypersystems, have all been influential in the adoption of hypersystems within the humanities. In addition, innovative conferences, increasingly meaningful publications, and ingenious applications have helped drive the hypersystem movement forward. What was invisible at the start of the decade—and even half way through it—had by its end become apparent. Although phrases such as "new technologies for the 1990s" may be trite, as Janet H. Murray (1991) noted while discussing the use of computers for linguistic analysis, "hypertext and hypermedia, theoretical for decades, are on the verge of becoming commonplace" and, together with interactive video and other techniques, the result will be "methods that promise to be different in kind rather than degree" (p. 1).

LIBRARIES AND HYPERSYSTEMS: BACKGROUND

Largely through the introduction of HyperCard, hypersystems became appealing for library educational needs in the late 1980s as a means of:

1. using attractive technology to motivate students to learn basic library skills (D'Elia, 1989, p. 21);
2. substituting technology for inadequate staff in providing information (p. 22); and
3. serving as a technological variant of library guides in helping a user navigate a library (Ertel & Oros, 1989, p. 47).

These principles, even though drawn from experiences in a school and special library, are broadly applicable. As a result of exposure (Byles, 1988; Smith, 1988; Bevilacqua 1989a; McClelland, 1989; Franklin, 1988, 1990a) and appeal, various libraries initially began producing library tours, particularly directed at undergraduate students, that frequently used HyperCard's basic elements mixed with unsophisticated graphics. Others, including the tour of Boston for the Library and Information Technology Conference held there (Bevilacqua, 1989b) and a tour of Glasgow (Baird, 1988), had the merit of being carefully defined, of using HyperCard's talent for including smaller bits of information on discrete cards—an advantage since HyperCard's original metaphor was 3 inch by 5 inch cards in a stack—and incorporating informative graphics. Libraries have moved on from these basics to using applications that link Macintosh technology to other resources (Wilhite & Dearie, 1990), that have generic applications (Welsch & Loomis, 1990), or imaginatively employ hypertext's flexibility for access to a variety of materials.

To conclude that hypertext concepts have been immediately accepted by the library community would be inaccurate. Recent comments include the suggestion that "hypertext developers have too much dazzled the present early generation of users with the flash & sizzle..." and that "hypertext tends to be confusing" (McAleese & Green, 1991). As we look back at some of those early HyperCard efforts with flashing buttons, we can share some concerns about misapplied technology. But doubts notwithstanding, any technology that is open-ended, that is attractive to newcomers and experienced users alike, and that can offer access to digitized texts as well as images, seems likely to have staying power.

LIBRARIES, HUMANITIES, AND HYPERSYSTEMS

Issues concerning the inclusion of hypersystems for the humanities within a library context seem less clear than the use of HyperCard for library tours or other functions. Prevailing orthodoxy

about the irrevocable imminence of technology and of the significance of hypersystems may not, or may not yet, apply within a library humanistic context. Although descriptions of individual projects and enterprises can be appealing and technical and other aspects of hypersystems may seem to make them inexorably necessary in libraries, there are challenges innate to the use of hypertext/hypermedia for the study of humanistic subjects that need to be addressed if such systems are to be successfully employed, including: (1) financing and implementation; (2) information validation; (3) humanist attitudes toward computing; and (4) related issues.

Financing and Implementation

A basic truth for any library in the 1990s is lack of funds for financing new projects, especially including hypermedia: "Going broke in interactive multimedia can mean," as Jim Heid (1991) wrote quite simply, "going broke" (p. 232). Promises that: "In another five years, schools will be able to purchase devices with greater capabilities than large research computers had five years ago" (Dede, 1987, p. 20) may not apply to multimedia workstations. Descriptions of some of the hypersystems mentioned earlier and other published accounts (Gaines & Vickers, 1988, pp. 3-4) suggest that the equipment needed to access these in libraries would typically include microcomputers with added internal random access memory (RAM), large high-quality monitors, speakers (or more typically headphones to reduce noise), videodisk players, a mouse or pointing device, graphics display screens, keyboards for text input, and CD-ROM players, together with appropriate software. Promises that: "The cost of computing equipment will continue to decline dramatically" (Weber, 1990, p. 3) in many respects would not apply to hypersystems. Large-screen monitors in the 27 inch and larger size that effectively display hypermedia applications have not yet reached the mass-market levels that would force costs down. As an information professional who holds a joint library and computing center appointment noted (Halbert, 1990), the implementation of "multimedia requires a quantum leap in hardware beyond the typical personal computer of the 1980s...and has troubling implications for libraries, which have frankly not yet caught up with the computing media developed in the eighties" (p. 7). When library costs are projected for the 10 or 100 workstations that might be needed, the equipment for large-scale hypermedia implementation may remain beyond the reach of all but the best financed libraries or those generously supplied with equipment, usually for experimental and not operational programs, by the computer manufacturers themselves.

Questions have been raised about even high-quality products that should alert librarians to potential problems. In discussing the BBC's Domesday Book project, the reviewers, although little doubting that English libraries should have it, raised valid points about implementation within a library context applicable to similar products in other situations. They found it difficult to categorize—"Is it a computer, is it a piece of A/V equipment, is it a reference tool?" (Noble & Hargreaves, 1987, p. 241)—which will mean that budgeting and allocation procedures will be complex. They also cautioned libraries about the need to consider such mundane questions as adequate electrical outlets, headphones to avoid noise, easy access to a reader service station to provide assistance, staff training, problems with the product itself, and other difficulties in placing it within a library context.

Nor is the issue of software resolved. The 1991 announcement that the Apple-IBM partnership would result in a new scripting language for hypermedia (Gore, 1991) should shake the confidence of any librarian who had believed that the software issue had been settled and that reliance on HyperCard or its clones would be sufficient for the future. Although this product is described as working on both computing platforms, that may be an issue, as other firms enter a fast-moving game, that is fluid as well. As Wagschal (1985) noted several years ago when discussing interactive technologies even before hypersystem approaches became common, the whirlwind pace of development, the sense of bewilderment that many librarians feel when confronting these technologies, and the choices and dilemmas that they face, will make the librarian's task increasingly difficult.

Evaluation

A profession that prides itself on the provision of accurate and timely information may find the implementation of hypersystems in the humanities to be complicated by lack of outside criteria satisfactory for validating use within a library context. Some commercial hypersystem products have been fully reviewed in standard reviewing media; libraries have used these judgments to successfully install them as part of user services. But most humanities efforts are noncommercial projects outside the usual purview of reviewing media and unfamiliar to librarians. Early in the development of hypertext systems, Catano (1979) illuminated the problem of validation by remarking of his project that: "We were aware of the need to obtain less subjective reactions as well" (p. 274). Although he showed a film of the project during a Modern Languages Association Conference session and collected empirical data based on statistical data (which showed that student averages

rose and that instructors' time was more efficiently used with the advent of hypertext), his efforts may have been the exception. Currently, few descriptions evaluate the effectiveness of non-commercial hypersystems in the humanities; accounts that cross the line between description and boosterism in the enthusiast press may be more common than we like to believe; articles by corporate representatives or by system originators seem questionable guides to implementation decisions. The moral aspects of the "cohabitation of universities with major marketers" and resolving inherent conflicts between groups that sell and those that teach ("Wooing of the Humanities," 1986) is particularly acute in this area because of equipment costs. As Raskin (1987) noted (in an article worth reading in detail): "The literature on Hypertext is generally effusive and non-critical" (p. 325). Lacking a comprehensive scientific evaluation system, libraries may have difficulty determining which hypersystems are appropriate for their clientele. Evaluation will be a vital element in the implementation process.

Reviews of commercial products that illuminate their weaknesses, such as those for *Culture 1.0* and the music products discussed earlier, confirm that stringent principles need to be applied before libraries embrace any system incautiously. The few reviews of noncommercial products that exist, such as of the Perseus Project (Hughes, 1988, pp. 2-4), suggest that even this highly regarded project, which this writer viewed favorably after use, also needs attentive care in implementation. Reviewers of the Domesday Project noted that there were conceptual and movement problems, some as simple as difficulties caused by users being unclear as to the distinction between "turning" and "moving" (Noble & Hargreaves, 1987, p. 244). Emerging, rather than established, technologies are unsuitable in library environments since, as Ted Haehler, a developer of HyperCard, noted: "A library gives a piece of software the ultimate torture test" (quoted in Ertel & Oros, 1989, p. 45). Shearer's (1988, pp. 417-18) reminder, that validation and information proofing, although they may seem "trivial," are necessary steps, seem especially relevant to the hypersystem context. The comparative dearth of electronic information resources in the humanities, linked to the appeal of hypersystems, may easily lead to enthusiasms that are expensive to support. Critical and comprehensive evaluation is mandatory before libraries adopt hypersystems products or even accept them as gifts.

Humanist Attitudes Toward Technology and Hypersystems

Attitudes of humanists toward technology in general, and perhaps toward hypertext/hypermedia in particular, may affect library success in implementing such systems. Previously, over-optimistic predictions

have helped engender humanist caution about technology. To paraphrase music professor David Crawford (1986, p. 569), there was euphoria during the 1960s as humanist scholars heard of computers that could translate, compose symphonies, and perform other extraordinarily difficult and, in fact, largely still undone tasks. As even an experienced hypersystem advocate conceded, scholars, particularly but not exclusively in the humanities, still use microcomputers predominantly for word processing (Yankelovich, 1991, p. 133) or in some instances for manipulating electronic versions of printed materials. As has been noted in a number of sources (Denley, 1990, p. 13), use of computers in the humanities is a new phenomenon. Therefore, scholars may not support what they do not know or, worse yet, what they suspect. In addition, they either question or resist suggestions (Heid, 1991, p. 232) that educators need to prepare for a future dominated by students who have been exposed to years of "non-linear, TV-based education." They are also concerned about the "insular" and "monolithic" nature of hypersystems (Meyrowitz, 1989, p. 107) that would cause them to abandon current systems. Although hypersystems, whose multimedia displays can overwhelm the senses, could reawaken the exhilaration, a reality is that many—perhaps most—humanists will not support library purchases of equipment for hypersystems if they are to the detriment of traditional purchasing. Finding the political combination that can convince humanists that libraries should acquire expensive hypersystems may be difficult.

Most humanities continue to rely on bodies of texts or sequences of information that generate both system and resource needs unique to those disciplines. Since researchers have not validated assumptions that all materials are suitable for hypertext/hypermedia system applications, questions may arise about the suitability of applying such techniques to Dickens or other Victorian authors, because reading a computer screen is up to 30 percent slower (Slatin, 1990, p. 129 citing Shneiderman). Those texts organized in small "chunks" that deal with one topic, such as some encyclopedias (Beekman & Beekman, 1991) or other reference works, or with one theme, are most suitable (Kearsley, 1988, p. 21). Systems such as *Context32* or *Perseus* rely on extensive print sources and were developed largely as student aids to supplement text sources, not supplant them. Carlson (1990a) also suggests that, since "hypertext transforms the implicit knowledge structure of text into an explicit one," not all sources are suitable (p. 115). In addition, other humanities skills, particularly those that are not immediately apparent or confirmable, such as heightening sensitivity, developing critical thinking, and cultivating

appropriate responses to ethical situations, may be neglected (Steig, 1987, p. 39).

Related Issues

Although hypersystems that relate a work of art to other sources or act as a tool to reconstruct the ancient world are valuable, they may not achieve their fullest evolutionary potential until they mature as active tools for information distribution. That maturation would have conditions and implications. Some scholars believe that hypersystem "publications" would need to carry the same weight as traditional print works in the academic promotion and tenure process in the humanities (Crane, 1990b). Without scholarly accreditation for that time-consuming work, as noted in the works of George Landow (Crane, 1987, p. 52), and even though groups such as archaeologists may be conscious of the capabilities of hypersystems to enhance information distribution capabilities, fulfilling the technology's potential may be delayed because the current tenure system allows little incentive for experimentation. If this barrier is breached and scholarly publications that are, in themselves, hypersystem applications begin to appear, the implications for libraries will be far-reaching and complex. Even before libraries have fully confronted other issues of information in electronic formats, they may need to address acquisition and preservation questions that are far-reaching and different in degree because of extensive and expensive equipment and software requirements.

Finally, libraries need to recognize copyright barriers to hypersystems in the humanities. Comparatively few system designers (*Context32* at Brown University being a notable exception) mention the inclusion of copyrighted texts. With most humanistic texts protected by copyright laws, as inclusion of the issue in an important forthcoming book (Haynes, 1991) suggests, its importance as a limiting factor in hypermedia implementation may be substantial. Investing in expensive library equipment and then being required to pay substantial prices for information in hypermedia formats, or being unable to acquire materials in sufficient quantity to justify expenditures, are thoughtful issues for library implementation.

CONCLUSIONS

Humanists have made significant strides in the theory and use of hypersystems. Their writings constitute, for libraries contemplating the implementation of information systems of any kind and for librarians dealing with the humanities and other fields, important bodies of fundamental knowledge that address serious information

issues. The rules for hypersystem linkages that such authors as Landow (1989b) have evolved for literary linkages contain general principles applicable to all situations. Experiments and systems over the past decade, and particularly since 1985, have demonstrated the application of hypersystem concepts to a variety of humanistic subjects and situations and their potential for operation elsewhere. Librarians who ignore these writings and developments do so at their intellectual peril for these hypertext/hypermedia systems signify potentially important trends for the future. The concepts are fundamental; the conceivable applications boundless.

In many respects libraries are logical settings for humanistic hypersystems. They house extensive information collections on the humanities and facilities for online searching and similar text-related activities and therefore should also include these new products (Franklin, 1988). Users could rationally expect that libraries would also contain humanistic hypersystems. Continuing to separate information by type rather than by discipline seems unresponsive to current information trends and prospects for the future. Suggestions that hypermedia systems are inherently too expensive could be countered by reminders that libraries intrinsically possess resources that are beyond the means of any but very few individuals (Halbert, 1990, p. 7).

Yet libraries must also temper admiration for hypersystem achievements and potentials with realities and be cognizant that theory and application do not always coincide. Although perhaps logical, implementation of hypersystems would cause libraries to be confronted with a series of problems that are difficult to resolve—costs, adequate evaluation, training for staff and patrons, educating humanists unfamiliar with hypersystems, training and employing technical staff, and balancing equipment costs against books during a period when publication continues unabated and the humanities remain firmly text-oriented disciplines. Less obvious are problems that implementation of untested technologies within demanding library environments could cause in user and staff stress while the human interface evolves to satisfactory standards (McKnight et al., 1989).

Libraries must also be aware of and address the position of hypersystems within humanities information needs. Recent symposia that addressed those requirements unfortunately demonstrated a lack of awareness of their use that may not be unrelated to age (Lougee et al., 1990). *Humanists at Work* (University Library, 1989), an informative examination of how humanists find their information sources, included little mention, other than negative remarks from a sociologist intending to be provocative, of the use of computerized

resources of any kind and none of hypersystems. Another symposium (Batt & Martell, 1991) specifically related humanities and libraries within a technical context but dealt with text not hypersystem issues, which are scarcely mentioned. Even the *Humanities Computing Yearbook* (Lancashire, 1991) shows that, although hypersystems have become increasingly important in the last decade, text systems still dominate; hypertext occupies a relatively small percentage of its pages. The first volume (Hockey & Ide, 1991) of the new series "Research in Humanities Computing," also focused on text even though some articles (Brunet, 1991) incorporate hypersystem concepts within broader elements of study. Although hypersystems have staying power, libraries must also ask whether they are sufficiently important to a local clientele to justify cost and other factors.

Beliefs that books, particularly in the humanities, are "historical artifacts" soon to be replaced by easily affordable and accessible hardware and software are "fantasies," whether in a hypersystem or other computer framework, as Schuman (1990) accurately noted (p. 35). Yet librarians sometimes seem to believe, in part due to hypersystem advocates, that the electronic library is here. In an article frequently cited by hypertext critics, Jef Raskin (1987) suggested that too much was being made of hypertext and accused Ted Nelson of writing "with a messianic verve characteristic of visionaries" but producing little but experimental projects that remained largely unfinished (p. 325). Just as over-enthusiastic writings about the computer three decades ago were unwarranted, libraries must now temper hypersystem ardor with reality. Yet titles such as "Breaking the Tyranny of Text" (Vandergrift, 1988), albeit misleading since it actually proposes that libraries use the technology to "enhance the understanding and enjoyment of literary works" (p. 31) and not eliminate them, seem to represent a common frame of mind. While hypersystems have immense potential, to believe that they will *supplant* printed materials instead of enhance them or place them into context would be unwarranted and inimical to the current work patterns of most humanists. Although hypersystems have demonstrated their validity in numerous commercial and noncommercial efforts, for many humanists the humanities are not bits of information but linear systems—books, periodicals, scores—that are likely to remain unprecedented sources for humanistic information for the foreseeable future. The writings of proselytizers who want the public, schools, and/or libraries to adopt one system or the other, and their sometimes extravagant claims for the educational or research capabilities of any system need to be carefully validated, a process difficult with the current state of many humanities projects, before libraries open the Pandora's box of hypersystems.

As libraries contemplate the implementation of humanistic hypertext/hypermedia systems, they will need to consider questions that range from philosophical issues related to the nature of computing for the humanities to the concrete question of finding funds to purchase expensive equipment. As the issue continues to evolve in the thoughtful writings of humanist scholars that may assist libraries in planning for another new information age that effectively employs the wonders of hypersystems, a maxim (quoted in Wyatt, 1988) from T.S. Eliot that: "Between the idea And the reality...Falls the Shadow" (p. 79) may be a viable guide in seeking to resolve these questions.

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