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The Electronic Journal as the Heart of an Online Scholarly Community

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ABSTRACT

THIS ARTICLE EXAMINES THE ROLE OF electronic academic journals within
scholarly communities. Scholarly communities are best understood
as discourse communities which share symbol systems as well as con-
ventions for communication. We discuss the ways in which the net-
work and the electronic journals it hosts can play an important role
in facilitating the routine discourse processes of scholarly communi-
ties. However, we also argue that the new medium will change the
way that scholars read and write, the way they do research, and the
form of research products. We consider in detail our experiences
with the *Electronic Journal of Communication/La Revue Électronique de Com-
munication,* an electronic journal serving an online community of com-
munication scholars and students.

INTRODUCTION

Scholarly journals serve many purposes within the academic world,
the importance of which vary with the role and perspective of particu-
lar participants. For librarians, journals constitute the scholarly
archive. They are the ultimate and final repositories of knowledge
within academic disciplines, the court of last resort to which inquirers
are referred when there is a need to answer questions about what is
and is not known within a body of knowledge. For university admin-
istrators, scholarly journals represent a kind of academic score card.
They provide a permanent record of individual and institutional ac-

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complishment within the knowledge-productive enterprises of the disciplines, thus helping to establish relative status within a field of competitors. For practicing scholars, academic journals function principally as channels of communication. As one form of scholarly publishing, academic journals are "part of a multiplicity of means by which communities communicate with themselves" (Lorimar, 1993, p. 212).

The recent appearance of electronic scholarly journals—academic serials that are delivered through the Internet and its associated technologies—is an innovation with implications more profound than the simple replacement of one mode of information transmission with another. The electronic scholarly journal promises to alter forever the economic, professional, organizational, and disciplinary relationships within the academic world that have been founded upon the technology of print and the medium of paper. In this article, we examine some of the implications of the network and the academic journals it supports for the practices and products of scholarly communities.

We begin this discussion by considering the qualities of community, particularly as they relate to scholarly disciplines and the role that academic journals play within scholarly communities. We then consider various ways in which the network and electronic academic journals both support and alter the development of scholarly communities. As an extended example, we discuss our experiences with the *Electronic Journal of Communication/La Revue Électronique de Communication (EJC/REC)*, an electronic journal serving an online community of communication scholars and students.

SCHOLARLY COMMUNITIES

What is a scholarly community? Most of us have no trouble identifying what is and isn't scholarly. But the idea of "community" presents certain problems that social scientists have grappled with for most of the last century. Traditionally, sociologists and anthropologists have regarded communities as based on geographical or physical proximity; however, the joint impact of industrialization, urbanization, and modern transportation and communication systems has diminished the usefulness of proximity in delimiting the boundaries of communities in the twentieth century. As the geographical basis of community boundaries has eroded, sociologists and anthropologists have been forced to choose between abandoning altogether the concept of community in the study of modern society or reexamining their understanding of the social features that are fundamental to the constitution of community.

In response, some theorists have suggested that communities are collectivities of like-minded individuals formed when a group

of people comes to think in roughly the same way, sharing founda-
tional beliefs, and agreeing on important issues. But Cohen (1985)
notes that most of the social collectivities we would regard as com-
munities are characterized by deep and enduring disagreements over
fundamental issues. Alternatively, he suggests that what constitutes com-
munity is not a shared set of beliefs but is rather a common symbolic
system comprised of a shared set of symbols, constructs, and norms
for communication through which the routine discourse activities of
a people takes place. "Community itself and everything within it,"
Cohen argues, "has a symbolic dimension, and, further, . . . this di-
mension does not exist as some kind of consensus of sentiment.
Rather, it exists as something for people 'to think with.' The symbols
of community are mental constructs: they provide people with the
means to make meaning. In so doing, they also provide them with
the means to express the particular meanings which the community
has for them" (p. 19). Thus, what is common to the group of people
who comprise a community is not a tract of physical space or unifor-
mity in the meanings of relevant phenomena, but, again in Cohen's
terms, a "commonality of forms" (p. 20).

Members of a community use their shared symbol systems to ac-
complish many individual and social objectives, but one of the most
important of these is to demarcate the existence of the community
itself. The idea of participating in a community implies that some
individuals are members while others are not. In this sense, commu-
nity is a relational construct, as Cohen (1985) notes. Because com-
munities interact with other communities, differentiation between com-
munities through the establishment of boundaries is one purpose of
symbolic activities that is essential to community building. In fact,
the less concrete or physical the boundaries between communities of
individuals, the more important will be the symbolic activities a group
uses to assert and maintain the boundaries of their community.

Given this perspective, community continues to be a highly use-
ful theoretical and lay concept for understanding how groups of people
organize and differentiate themselves within a culture or society. In-
dividuals belong to many different communities within the course of
their personal and professional lives—some bounded by ethnicity,
some by professional or organizational affiliations, and some by deep
and compelling interests in particular subject matters, as for example,
scholarly communities.

Some further implications of this symbol-based view of commu-
nity can be recognized by noting that scholarly communities might
also be described as "discourse communities." The term "discourse
community" is taken from the literature of composition studies and
focuses attention on the particular conventions for written communi-

cation that characterize a group of individuals. While there is no single concise definition of discourse community, Faigley's (1985) description is one of the most complete. He tells us that a discourse community is a specialized group, such as an academic discipline, with members who "know what is worth communicating, how it can be communicated, what other members of the community are likely to know and believe to be true about certain subjects, how other members can be persuaded, and so on" (p. 238).

Discourse communities have special ways of knowing, believing, and persuading. The fact that such conventions are held in common means that experienced writers within the discourse community are able to draw upon them for knowledge about what will count as appropriate language, appropriate evidence, and appropriate reasoning. In a strong sense then, members of discourse communities know *how* to communicate with each other. The effectiveness of their written products is evaluated according to standards or criteria that are, at least in part, idiosyncratic to the discourse community.

Most discussions of discourse communities are based upon the assumption that members orient around its media—that is, the specific channels and genres that members use to communicate, which, it is worth pointing out, have been regarded implicitly as print-based, principally because, until recently, there has been no apparent alternative. Most scholarly communities are oriented particularly around refereed journals as channels for communication and the research article as a genre of communication. While scholars share information and debate issues at conferences and other face-to-face meetings, for most disciplines, the refereed journal is the primary "site" for communication.

New academic journals have appeared in print as individuals recognized the need for outlets for emerging research specialties or when minorities within a scholarly community have been marginalized by a dominant set of interests. In such cases the initiation of new journals has contributed to the process of building and differentiating scholarly communities. It seems likely that the network and the electronic scholarly journals it now hosts will similarly participate in certain aspects of community building within the academic world. But this new medium for communication may also stimulate more fundamental changes in the practices and products of scholarship within scholarly communities.

ELECTRONIC JOURNALS AND SCHOLARLY COMMUNITIES

Our perspective implies that communication is the lifeblood of a scholarly community and that, indeed, the community exists in its most physical sense where the communication takes place.

Thus, the success of an electronic academic journal will depend on the extent to which members of a disciplinary community actually use it to take part in the routine discourse processes through which knowledge is validated and distributed. Scholars who initiate electronic academic journals face the normal sociological challenges associated with establishing the legitimacy and credibility of any new journal. But they also confront a new set of challenges that derive from attempting to orient the disciplinary community to a new medium for communication and the potentially new practices to which such a medium may give rise. Whether the developers of these journals know it or not, part of their task is to find a way to extend a disciplinary community to the network or to create an entirely new online disciplinary community. It may be many years before electronic journals achieve the level of credibility and stature of their print counterparts. However, the process of legitimating electronic journals will be hastened by certain communication capabilities enabled by the technology that contribute to the growth and development of scholarly communities.

At this relatively early point in the use of the network, critics of academic networking have been justifiably concerned with dividing a disciplinary community into "haves" and "have nots" based upon members' access to the network and the hardware and software required for using it. But, as the costs of technology continue to decline and networking diffuses throughout the academic world, it is important to consider the other side of this issue, which is that the network supports a wide range of communication activities that enable a scholarly community to embrace more of its potential and actual members in discourse than has been possible through traditional communication media. Over 1,800 online conferences (Kovacs, 1994) covering seemingly every major field of academic inquiry now create social "spaces" where members of scholarly communities distributed around the world can come to share information and interaction. Such channels enable members of established communities to maintain continuing informal ties in the absence of ongoing face-to-face communication. Such channels also create the opportunity to assemble entirely new communities of scholars who share interests that may be otherwise obscured by the segmentation of traditional disciplinary divisions.

Further, the network promises to forge closer connections to its formal channels of communication within a community. Experiments that move existing journals onto the network are just beginning. For example, some university and professional society publishers, such as the American Chemical Society (Garson, 1994), the Johns Hopkins Press' Project MUSE (DeLoughry, 1994), and the University of California Press (Ekman & Quandt, 1994) are making available over the

Internet the contents of established journals. Moreover, some journals, such as the well-known *Online Journal of Current Clinical Trials,* have been conceived with the goal of using hypertext links to connect related articles as well as any commentary that might be attached to them (such as letters, rebuttals, and retractions) within a larger electronic archive of disciplinary work (see, e.g., Kellar, 1990). Such archives can enhance access and information retrieval, thus connecting scholars to the scholarly literature to a degree not previously possible.

Unlike print journals, electronic journals distributed through the network can be initiated with relatively little capital expenditure, which means that scholars have been economically less constrained in creating new journals. The majority of the new electronic journals have been initiated by scholars acting alone or in groups without financial assistance from publishers or professional organizations; these publications have been offered to subscribers over the network for free. It is too soon to say how long such journals can continue to be offered without an attempt to recover costs. However, the ability of the network to support grassroots publications, as well as scholars' willingness to perform both editorial and production roles without support, has made it possible for innovators to experiment with electronic journals designed to serve existing disciplinary communities and to build new interdisciplinary communities on the network. This loosening of economic constraints also means that article and journal size can vary more widely thereby allowing more individuals to participate in the scholarly conversations that journals were intended to facilitate.

When new electronic journals are complemented by other means for communication available on the network, such as dedicated listserv discussions and the various virtual reality environments that are becoming available (e.g., MOOs and MUDs), then the opportunities for involving members of an international scholarly community in disciplinary discourse are heightened considerably. Several electronic journals, such as *Surfaces,* founded by Jean-Claude Guédon and Bill Readings, and *Postmodern Culture,* edited by Eyal Amiran and John Unsworth, make use of precisely such capabilites. These channels for informal communication support the journal and its community-building enterprise by providing a context in which authors and readers can discuss works appearing in the journal, thus extending opportunities to engage in scholarly discourse. This additional contact is especially important for interdisciplinary communities, where face-to-face conferences may be expensive to attend and take place only sporadically.

Finally, the comparative increases in speed afforded by the network can also facilitate scholarly dialogue within a community. Some of the

current experiments in electronic publication are attempts to capitalize
on this advantage. Harnad (1991) has argued that when manuscripts
and feedback are exchanged through the network, scholarship can
progress at a speed and tempo more similar to that of natural thought
and speech. *Psycoloquy,* the electronic journal founded by Harnad, auto-
mates the delivery of current research reports and peer responses, re-
ducing time lags from months to hours and preserving the interactive
quality that ideally should characterize such processes. *Postmodern Cul-
ture* solicits self-nominated peer reviewers by issuing a call to all sub-
scribers with descriptions of essays recently submitted to the journal;
this both speeds up the process of peer review and opens participa-
tion to a greater number of scholars.

    We have been discussing various ways in which the network and
electronic journals distributed through it can contribute to the devel-
opment of scholarly communities. However, it is important to recog-
nize that this new medium may also stimulate changes in the tradi-
tional discourse practices and products of disciplines, with the corre-
sponding potential to undermine some of the foundations upon which
a community is built. One example of this is the burgeoning use of
the network to facilitate preprint distribution, a practice that began
in high energy physics (Broad, 1993; Taubes 1993) and is now being
tried in mathematics (Rodgers et al., forthcoming), philosophy (In-
ternational Philosophical Preprint Exchange, 1994), and
economics(Economics WPA World Wide Web Service, 1994). Okerson
(1994) reports that electronic preprint distribution in high energy
physics has been so successful that the Stanford Linear Accelerator
Center has recently decided to cease paper preprint distribution be-
cause more than half of them had already circulated widely on the
Internet. In this case, preprint distribution appears to have the po-
tential to eliminate the communication functions of print journals for
practicing scholars. It is worth noting that relations of power are
implicated in the use of any communication medium, which means
that a shift in medium may also signify displacements among those
who wield power, with corresponding reverberations on the social
structure of the community.

    Less dramatic, but equally important, are the ways in which the
electronic medium can alter community discourse practices by increas-
ing access to other symbol systems used within the community but
which typically are not available through traditional print publication.
This is the goal of some electronic journals that plan to provide read-
ers with access both to text and related images as well as graphic and
quantitative data. For example, the online *Journal of Statistics Educa-
tion* plans to store articles within a database that will allow readers to

retrieve associated data sets and graphics as well as the text of the article (Solomon et al., 1993). Similarly, the *Journal of Fluids Engineering* will enable subscribers to read not only the results of research in an article but also will allow them to examine the raw data associated with that particular research study (Ekman & Quandt, 1994).

Others have argued that the ability to create collaborative texts on the network may play a role in changing the nature of writing and its outcome, producing a dialogic document that more faithfully reflects the interactive nature of scholarly discourse (Harrison & Stephen, 1992; Tuman, 1992). Guédon (forthcoming) suggests that the ability to incorporate comments and arguments from both readers and authors in online discussions about journal articles may itself yield a new form of scholarly product—one in which the integrity of a monological text authored by one individual is eroded, gradually giving way to the creation of an online collaborative text in which participants serve as both readers and writers. Such texts may well recover the ancient dialogic character of scholarly communication, which has always been poorly reflected in print publication.

Most new electronic journals have been developed under the assumption that articles will be downloaded and printed in order to be read. Such efforts ignore the possibility that electronic journals may be instrumental in reconfiguring more fundamental research practices within scholarly communities. In response to this potential, the *Electronic Journal of Communication/La Revue Électronique de Communication,* offered under the auspices of Comserve, will soon be accompanied by a software system that facilitates the ability of subscribers to read articles on their computer screens rather than downloading them to print. The display program attempts to overcome some of the traditional limitations of reading text on a CRT—for example, by enabling readers to move directly from text citations and footnotes to references via hypertext-style links and allowing them to annotate text in a pop-up notation space that can be saved for future inspection. We provide more information about this system below. But first a description of the electronic community of which *EJC/REC* is the heart.

COMSERVE: AN ELECTRONIC COMMUNITY
OF COMMUNICATION SCHOLARS

When James Winter of the University of Windsor and Claude Martin of the University of Montreal approached the authors in 1989 with the idea of the *Electronic Journal of Communication/La Revue Électronique de Communication,* we were apprehensive. Our experience with the Comserve project had demonstrated that people were enthusiastic about using computer networks for informal scholarly communication, but establishing a formal channel for scholarly communication

seemed a far riskier test of the ability of the networks to support scholarly communities. However, we decided ultimately that offering an electronic scholarly journal under the auspices of the Comserve project was an excellent way to experiment with a new journal and a new technology because Comserve had already established an online community of communication scholars with proven computer literacy who, if not initially receptive to the idea of an electronic journal, would at least be sufficiently technically skilled to be able to access it (see Harrison et al., 1991, for information about early design decisions).

A few words about the Comserve project are in order at this point (see Harrison & Stephen, 1992; Stephen & Harrison, 1993 for more detail). Comserve is an electronic center for scholarship in communication studies accessible entirely through computer networks.The service, which has existed since 1986, provides a growing number of resources for communication faculty and students that now include:

- *Electronic Conferences:* A suite of over thirty public and private electronic conferences addressing topics in communication scholarship. The public conferences, called "hotlines," may be used by anyone for the purpose of discussion, advice asking/giving, posing questions, and other forms of scholarly interaction. The private conferences are reserved for relatively smaller special groups of scholars pursuing specific scholarly projects, For example, private conferences have been used by faculty and students in cooperative interuniversity course projects, by editors and authors assembling an anthology, and by an international team of over 100 researchers pursuing a common research project.
- *Electronic Teaching and Research Resources:* A resource library of over 3,000 documents containing research, teaching, and other professionally useful information. The resource library consists of bibliographies, syllabi, research instruments, conference announcements, position advertisements, electronic newsletters, and other materials deemed potentially useful to communication scholars.
- *Journals Index:* An electronic index to over fifty scholarly journals in the communication discipline. The index consists of bibliographic information for articles published in communication or related scholarly journals that may be searched by title, author, or by journal. The index, which is supplemented by a PC-based companion version, is the largest and most comprehensive index to the communication literature—either in print or electronic media.

Across the course of the last eight years, more than 40,000 faculty, students, and professionals from over 100 countries around the world have found their way to Comserve and availed themselves of its

resources.   Many of these, of course, have not been affiliated with communication studies; Comserve's ongoing client population fluctuates between 7,500 and 8,000.   To support international users, Comserve can respond to commands in French, Portuguese, and Spanish.   We hoped that this population of computer literate scholars and students, representing more than the membership of some of our largest professional organizations, could be induced to support an electronic publication.

Since then, part of Comserve's user population has evolved into a scholarly association, which is called the "Communication Institute for Online Scholarship" (CIOS).   The CIOS is a nonprofit association with approximately 250 individual and 75 institutional members, whose mission is to support the use of information technologies in the service of communication scholarship.   The CIOS is the parent organization for the Comserve project; *EJC/REC* has now become the official scholarly journal of the CIOS.

EJC/REC is offered as a series of topically oriented issues, each of which is edited by one or more established scholars in the field who propose their own focus for the issue, form an editorial board, and solicit and review submissions.   Typically, these editors are respected scholars who have demonstrated a degree of receptivity to the new medium.   Editors are free to choose their own procedures for their issue, with the provision that each submission is peer reviewed.   In this way, we have sought to establish credibility for *EJC/REC* in its early days, attract an audience for the journal as well as authors representing various subfields of communication scholarship, and disperse the burdens and risks associated with this new endeavor.

Issues of *EJC/REC* have attempted to exploit the speed and international advantages conferred by the electronic medium.   For example, *EJC/REC* solicited and disseminated the first communication scholarship on the Gulf War of which we are aware.   The issue on the "Gulf War and the Media" came out within eight months of the end of the war.   We are also concentrating on using the journal to further internationalize the scholarly community.   For example, past and future issues focus on women and the Canadian media, international communication research, and Australian communication scholarship, and editors now hail from the United States, Australia, Canada, and Finland.   The journal attempts to be marginally bi-lingual; abstracts of the articles and the introduction to each issue are published in both French and English.

CONSUMING ELECTRONIC JOURNALS ELECTRONICALLY

Like most other existing electronic journals, *EJC/REC* has been distributed through a dedicated network "list" or conference, which

announces the release of each issue. Subscribers receive a "table of contents" describing the focus of the issue, listing the articles that appear, and abstracts for each article. Members of the CIOS, or those from affiliated institutions, can obtain articles of interest by requesting the relevant files from Comserve's resource library.

More recently, however, we have undertaken the development of a software program that displays the contents of an electronic journal electronically in a way that both facilitates traditional scholarly reading practices and lays the basis for new electronically inspired scholarly practices. Virbel (1993), in discussing the development of a reading workstation designed for research in the humanities, describes the challenges involved in the process of computerizing scholarly practices: "It is obvious that reading for study and research, and the intellectual work associated with it, involves practices and methods that are centuries, even millennia, old. Some seem easily reproducible in a digital context, others less so. Most seem to need a more or less profound redefinition. Finally, the computer opens up some entirely new reading practices" (pp. 36-37). We have sought to identify some of these practices and incorporate them into the design of a software system that we hope will serve as a foundation for more sophisticated versions in the future.

The system we have created allows the reader to peruse the contents of a journal issue and engage in rudimentary, but essential, scholarly practices while the text maintains its electronic form. For example, readers choose articles of interest by clicking on the relevant title in the table of contents, which calls up the text instantly. To ascertain the interest value of the article, the system enables the reader to page immediately between sections of an article to get an overview of its focus and direction. Hypertext-style links between citations and footnotes in the text and the full references in the footnote or endnote sections enable readers to consult documentation with greater facility than is generally possible in print publication.

The system allows the reader to annotate sections of a text in a way similar to the material operations readers generally perform on paper. The reader may choose to highlight different portions of an article, the results of which will be saved for future consultations with the text. It is also possible to create a link between a section of the text and a pop-up notation space that will permit readers to make "marginal" comments that can also be saved for future inspection. If the reader desires, both the text and associated annotations may be printed at any time.

The software system further enables a few special features that should help to ease the transition to electronic journals and create the foundation for more sophisticated electronic reading technology. First, the system creates a special encrypted version of a journal issue that will ensure that the reader is receiving contents in their original "official" form. The contents of the issue proper cannot be written over. This will help to allay concerns voiced by researchers and librarians that journal articles transmitted via network may present altered versions of the texts.

Second, the ability to create hypertext-style links within the text can be eventually extended to the creation of hypertext-style links between the text of an article and other relevant texts appearing in the journal or in other journals that may be added to a cumulatively developing database. Such a feature anticipates the possibility that the literature of a discipline may be made increasingly available electronically and creates the foundation for developing an interconnected archive. We shift now to a brief technical tour of the electronic journal software.

MARKUP AND DISPLAY: A SOFTWARE SYSTEM FOR ELECTRONIC PUBLICATION

Our electronic journal software system consists of two programs. One, named "Markup," is used by journal production/editorial staff to create a journal issue. A second program, named "Display," is the electronic journal display system itself—the program that is actually used by someone reading the journal.

Although more expensive technologies (such as VGA graphics and high speed CPUs) permit the inclusion of some features not available in our software (such as use of custom typefaces and scalable fonts and the inclusion of graphic images), we determined early in the design of the software to avoid incorporating features that require expensive technologies. Our design strategy was to incorporate all possible advantages that digitization can confer upon textual display (i.e., hypertext linking, word searching, etc.) without allowing the requirements of the technology to limit the journal's readership or to burden the journal's readership with the need to acquire special hardware or software. The clear trend of the last decade has been for the computing industry to introduce continuously new technologies that demand new hardware or software systems and to do so at such a staggering pace that it is no longer clear that users are interested in continually replacing working systems merely to keep up with the latest operating system, high speed processor, or other innovation. To write software that depends upon, or attempts to capitalize upon, technologies at the cutting edge may be unnecessarily expensive.

Thus we decided to work within the framework of IBM/MS-DOS text mode compatability. This decision assured that our electronic journal is viewable on the largest possible range of computer makes and models and that its technology depends upon modes of operation that are built into virtually all computers and therefore requires no additional equipment or software. DOS text mode compatibility requires the bare minimum of computing equipment, and virtually all computer systems now manufactured for personal use retain the capability to operate in this mode.

PRIMARY FEATURES OF THE DISPLAY SOFTWARE SYSTEM

The user interface is full screen with user options available through function keys and pull-down menus arrayed on the top line of the screen. No feature of the display program depends on a mouse or other pointing device (e.g., trackball), but the program automatically recognizes when such devices are available and allows the reader to use one to control many aspects of the program's performance (generally, opening and closing windows, moving pop-up windows, and selecting menu options). At any point in the program, the journal reader is able to obtain brief built-in help regarding operation of the program by pressing a function key. This key assignment is standardized in all of the display program's environments (e.g., table of contents environment, article reading environment, and so on).

The top line pull-down menus contain options that allow such things as choice of color schemes to be used while displaying the journal article, a switch controlling how often the program will automatically save changes in marginal notes and underlining made by the reader, and a switch controlling whether or not a clock will be displayed in the upper right corner of all program screens. The reader is able to save configuration choices so that they need not be reset each time the program is executed. A "File" pull-down option provides a means for printing an article (with or without the user's saved memos and underlines), the table of contents, or a file of information about article authors. When in the article reading environment, the File option also controls the way in which alterations (memo text, underlining) are saved in an article. In addition to the function key method described earlier, a "Help" pull-down option provides a way to read brief built-in context-sensitive help screens.

On starting, the program displays a custom journal masthead or "logo screen" that will be supplied by the journal editorial staff and incorporated into an issue using the "Markup" program (described later). From it, the reader can proceed to the table of contents environment, which displays information about article titles, authors,

and pagination for a complete journal issue, or to the author infor-
mation environment, which displays professional information about
article authors.

From the table of contents environment, readers can move into
and out of the "read article environment." In this environment, read-
ers can scroll through an article and find the next, or the most re-
cent, citation in the article by pressing a function key.

- *Highlighting.* The reader is able to highlight text within an article. A pull-
  down menu allows the reader to indicate if he or she desires to view the
  article with or without display of any highlights. Similarly, the print option
  provides a way to print the article with or without highlights.
- *Embedded memos.* At any point while displaying an article, the reader
  can embed a memo (i.e., a textual comment) in a pop-up box by posi-
  tioning the cursor on the point in the text at which the memo is rel-
  evant and then pressing a function key. A memo box will appear, and
  the reader can type text into it. The presence of a memo is indicated
  by the appearance of a marker symbol in the right margin of the text.
- *Bookmarks.* The reader can create bookmarks to facilitate quick return
  to a particular place in the text in a subsequent use of the Display
  program. The bookmark is created by positioning the cursor at the
  desired point in the text and pressing a function key. The reader is
  prompted for a brief phrase to associate with the marked spot. A di-
  rectory of available bookmarks can be displayed through an option in
  the File pull-down menu.
- *Pop-up tables, figures, references, and notes.* The Markup program pro-
  vides a way to create hypertext-style links among certain elements of
  an article. The software provides for four classes of elements: (1) tables;
  (2) figures; (3) elements of a bibliography or reference list; and
  (4) footnotes, reference notes, and endnotes. The mechanism for dis-
  playing these elements is the same: position the cursor on or about
  the location at which the material is relevant and press a function key.
  The relevant text appears in an appropriately labeled pop-up box which
  can be closed by pressing the escape key or clicking the mouse on a
  square in the upper left corner of the box. Pressing a function key will
  move the cursor to the next spot in the article at which a pop-up of any
  kind is available. The direction of this search (forward or backward)
  can be set by the reader.
- *Text searching.* The reader can find his or her way through the text by
  searching for any word. The reader is prompted for a search target
  string and can press escape to abort the operation or enter/return to
  process the search. A successful search positions the article so that the
  line containing the located text is center screen and the cursor is posi-
  tioned on the first character of the word.

The Markup Software System

The Markup software system operates on journal article files in ASCII format, transforming them into a single journal issue that can be distributed with the Display software program. The Markup program itself is not distributed to end-users; it is a tool for the journal production staff to use to create an issue of an electronic journal.

The Markup program is used after the set of articles comprising a journal issue has been formatted with a text editing program. These articles must be basic ASCII text files. They can contain any element of the standard ASCII character set. The editorial staff may insert "tags" within the body of the article text to identify blocks of text that comprise endnotes, reference notes, tables, figures, and bibliographic references. These definitions are supplied by inserting tag words in the text that mark the start and stop of such blocks. The tags are processed by the Markup program to emphasize text (by giving it a unique color), to identify textual elements, and to create hypertext-style links between these elements and particular spots in the article.

The Markup software system provides four functions: (1) translation of articles to a format that protects the text from alteration by end-users and makes the text unviewable without a program capable of decrypting them, such as the Display software system (this step also involves interpretation of the tag language described previously); (2) preview of a translated article; (3) creation of a journal release by identifying other files needed for the release and constructing the author information data and table of contents data, paginating the article, and finally binding the article files to the Display software; and (4) editing the journal release data to correct mistakes or to reflect changes.

We believe that these features of a display system for electronic text represent a first step in moving from a conception of electronic journal production that is still largely based upon a print metaphor to one that is more fully electronic. Obviously there is still much more that could be done. For example, our display program will rely on ASCII characters, since the publishing community still lacks an industry-wide standard for type, graphics, and page layout (and since our abilities to program our own publication solutions are quite limited). It is possible that this problem may soon be solved by one of the many competing platform-independent systems for desktop publishing finding their way currently into the marketplace. It is also possible that one or more of these systems may enable many of the features described above in our own prototype. But at present there is no platform-independent commercial standard and none of these products appears to have won the widespread endorsement of the pub-

lishing community. In the absence of such a standard, we have opted
to press ahead with our solution, recognizing that we are only making
a start, but that a start is exactly what is needed.

CONCLUSION

Most experiments in electronic journal publication have been un-
dertaken by volunteer scholars avidly exploring what academic com-
puter networks have to offer to their scholarly communities; we count
ourselves among this group. In doing so, the designers of electronic
journals are all acting very much in the role of Henry Oldenburg in
the seventeenth century, who coaxed natural scientists to share the
results of their observations and experiments in the form of letters
that he later published in what was then a completely new vehicle for
scholarly communication and one of the first academic journals, the
Philosophical Transactions of the Royal Society in London. In the in-
tervening centuries since the establishment of the *Philosophical Trans-
actions*, the form and content of the academic journal has been shaped
by the various scholarly communities that have adopted it as well as
by the contour of possibilities offered by the technology of print. We
expect that similar evolutions will begin to take place with existing
electronic journals.

Many scholars will no doubt be attracted to the network and to
electronic journals because the technology offers an opportunity to
participate, to a greater degree and in more useful ways, in the dis-
course of their community through scholarly forms that are some-
what familiar. Designers of electronic journals would do well to bear
in mind that the network can be used in many ways to facilitate the
routine discourse processes of their communities. But every new com-
munication medium bears within it the seeds of change. Electronic
journals are destined to change the way scholars read and write, the
way they do research, and the very form taken by their research prod-
ucts. Printed academic journals have been at the heart of the devel-
opment of the scholarly communities as we know them today. Elec-
tronic journals, and what they evolve into, will be at the heart of the
scholarly communities that are created tomorrow.

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Libraries, 1994.]

REFERENCES

Broad, W. J. (1993). Doing science on the network. *New York Times,* May 18, pp. C1, C10.
Cohen, A. P. (1985). *The symbolic construction of community.* London, England: Routledge.
DeLoughry, T. J. (1994). Journals via computers. *Chronicle of Higher Education,* March 9, pp.
   A25-A26.

Economics WPA World Wide Web Service. (1994). Available from: *URL:http://econwpa.wustl.edu:80*

Ekman, R. H., & Quandt, R. E. (1994). Scholarly communication, academic libraries, and technology. Available from: *gopher://arl.cni.org/00/scomm/scalt*

Faigley, L. (1985). Nonacademic writing: The social perspective. In L. Odell & D. Goswami (Eds.), *Writing in nonacademic settings* (pp. 231-248). New York: Guilford.

Garson, L. R. (1994). Investigations in electronic delivery of chemical information. In *Proceedings of the 1993 International Conference on Refereed Electronic Journals* (pp. 4.1-4.15). Winnepeg, Manitoba: University of Winnepeg Libraries.

Guédon, J. C. (in press). Electronic academic journals: From disciplines to "seminars"? In T. Harrison & T. Stephen (Eds.), *Computer networking and scholarly communication in the 21st century university*. Albany, NY: SUNY Press.

Harnad, S. (1991). Post-Gutenberg galaxy: The fourth revolution in the means of production of knowledge. *Public-Access Computer Systems Review, 2*(1), 39-53. Available from: *gopher://info.lib.uh.edu:70/00/articles/e-journals/uhlibrary/pacsreview/v2/n1/harnad.2n1*

Harrison, T. M., & Stephen, T. D. (1992). On-line disciplines: Computer-mediated scholarship in the humanities and social sciences. *Computers and the Humanities, 26*(3), 181-193.

Harrison, T. M.; Stephen, T. D.; & Winter, J. (1991). Online journals: Disciplinary designs for electronic scholarship. *Public Access Computer Systems Review, 2*(1), 25-38. Available from: *gopher://info.lib.uh.edu:70/00/articles/e-journals/uhlibrary/pacsreview/v2/n1/harrison.2n1*

International Philosophical Preprint Exchange. (1994). Available from: *http://phil-preprints.L.chiba-u.ac.jp/IPPE.html*

Kellar, L. (1990). *Functional overview of the electronic science journal*. Unpublished paper presented at the Asociation of Research Libraries Conference on Refereed Academic Publishing Projects, Raleigh, North Carolina.

Kovacs, D. (1994). *Directory of scholarly electronic conferences*, 8th revision. Available from: *gopher://una.hh.lib.umich.edu/1/inetdirs*

Lorimar, R. (1993). The socioeconomy of scholarly and cultural book publishing. *Media, Culture, and Society, 15*(2), 203-216.

Okerson, A. (1994). Introduction. In A. Okerson (Ed.), *Directory of electronic journals, newsletters, and academic discussion lists* (4th ed.). Washington, DC: Association of Research Libraries. Available from: *gopher://arl.cni.org/00/scomm/edir/eintro*

Rodgers, D. L.; Curnow, K. W.; Burton, D. R.; Ullmann, G. S.; & Wolf, W. (in press). Roadmap to scholarly electronic communication and publishing at the American Mathematical Society. In T. Harrison & T. Stephen (Eds.), *Computer networking and scholarly communication in the 21st century university*. Albany, NY: SUNY Press.

Solomon, D. L.; Arnold, J. T.; & Dietz, E. J. (1993). Starting a new journal in statistics education. In A. Okerson (Ed.), *Scholarly publishing on the electronic networks. The new generation: Visions and opportunities in electronic publishing* (Proceedings of the second symposium) (pp. 19-28). Washington, DC: Association of Research Libraries.

Stephen, T. D., & Harrison, T. M. (1993). Online academic centres: Building a community of scholars electronically. *Media Information Australia, 67*(1), 71-76.

Taubes, G. (1993). Publication by electronic mail takes physics by storm. *Science, 259,* 1246-1248.

Tuman, M. (1992). *Word perfect: Literacy in the computer age*. Pittsburgh, PA: University of Pittsburgh Press.

Virbel, J. (1993). Reading and managing texts on the Bibliotheque de France Station. In G. P. Landow & P. Delany (Eds.), *The digital word: Text-based computing in the humanities* (pp. 31-51). Cambridge, MA: MIT Press.