

Silver Stringers and Junior Journalists: Active information producers

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Two projects, Silver Stringers and Junior Journalists, are examples of a shift in the role of the news consumer—community members are actively engaged in publishing pursuits previously confined to the traditional media. Their activities range from news gathering and dissemination to asking questions and debating issues of importance, whether local, international, or topical in scope. This paper describes the evolution of these projects, the experiences of the participants, the technologies developed and employed, and the epistemological impact.

For nearly a decade, members of the MIT Media Laboratory's News in the Future research consortium (NiF) have been developing technologies to improve the efficiency, access, and utility of information. In the past four years, we have come to believe that the public has an important, active role to assume in making sense of this information, and our goals have gradually shifted toward developing technologies and processes that improve the quality of public discourse. As technology accelerates the global flow of ideas and information, we are concerned with the changes in thinking and learning that will support future solutions to social, cultural, and economic problems.

The increase in information flow provides many new opportunities for individuals to become better informed about the world. However, this also means that information consumers must become more selective, more critical, about what they see on their televisions, computer screens, and so on. As more people create and disseminate information via the

World Wide Web (www), it becomes increasingly difficult to discriminate truth from "noise." As the growth in information continues to explode, individuals will have to become more critical of their sources; they will have to engage in a form of media criticism that is rarely seen today.

Most views of media literacy tend to focus on analysis: how can we train people to be critical about what they see in the traditional press (and not-so-traditional Internet media)? In this paper, we argue another approach to learning media literacy—an approach based on synthesis. In particular, we see journalism as a model for thinking and creating. Experienced journalists have been trained to distill data into information, and, because they are practitioners, they often realize that a story written by someone unskilled in the art makes questionable assumptions. Being a journalist means thinking critically about the world in order to present it to others. Moreover, it means receiving critique and feedback from other journalists (and the public) about what makes a useful body of information.

We have experimented with journalism as a model for thinking and creating in work with ordinary citizens. We have spent several years developing and deploying tools for nonjournalists to create and distribute news. Improving the quality of public dis-

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course means helping others take a critical stance toward the information they see on a daily basis. It also means providing opportunities for individuals to contribute their own views and concerns to the wave of information dominated by the traditional press. In a sense, we are pushing media consumers to become active information producers. In doing so, we hope to see them develop their own skills as journalists and as critics of information.

In this paper, we examine how journalism can develop among groups of citizens who now have access to large audiences through the Internet. Although many community groups produce newsletters on paper, these tend to have a limited circulation. They also tend to be generated by a small handful of writers. For instance, high school yearbooks are typically created by a small staff, and the primary audience is limited to those who were part of the school experience. Similarly, local newspapers are created by a small number of citizens (i.e., the press) and often go unseen by others outside of the community.

We make two assumptions about news creation and distribution. First, news does not have to be created by a small group of specialists; all members of a community have stories to share, and their voices can be heard if they are given appropriate tools for expression. The second assumption is that people outside of a physical community may also have interests in local news. For instance, many individuals leave their hometown but may still be curious about events and people within that community. With these assumptions in mind, we encouraged several groups of citizens to create and publish community “newspapers” on the World Wide Web.

In this paper, we discuss our attempts to immerse adults and children in the hard, but fruitful, work of inquiry and storytelling. In one case, the Silver Stringers, a group of senior citizens, gathered together to create an on-line publication that has been running for more than four years. A second group, composed of children aged 10–16, have been writing a similar publication, *The Junior Journal*, for almost two years. In both cases, we have seen communities forge around journalism, creating stories of interest and concern for themselves and their Internet readers. The members of these journalism communities actively engage one another in debate over the content of their stories and, more importantly, the processes that they engage in as media producers. Rather than creating and posting individual Web pages, these communities have established editorial

processes to encourage group critiquing and learning. As they develop their stories, the participants seem to gain a better sense of their own identities; they realize that they can use their voices to affect their readership. And the collaborative editing process seems to help them develop a critical stance toward traditional media and the popular press; by challenging each other, they begin to understand the biases and critical thought processes that professional journalists display, and they can use this knowledge to question what they read in the press.

We begin by defining our notion of community: what it means for a group of individuals to come together around a common interest like journalism. We then introduce the Silver Stringers and Junior Journalists, two communities that have been creating news for several years. These groups have used a publishing system called Pluto, and its functions are outlined in the paper. We conclude by looking at ways that the communities have used the system to create stories and, in the process, change the ways that they think, learn, and debate about news.

Community

Many voices have been raised in the press and in academia about the effects of new media and Internet communication on an individual’s sense of identity and level of social interaction.^{1–3} Their concerns have a familiar ring. Technology has been of concern to the scholarly and political communities since the Industrial Revolution in the nineteenth century. As early as 1829, Thomas Carlyle wrote, “The machine represents a change in our whole way of life because ‘the same habit regulates not our modes of action alone, but our modes of thought and feeling. Men are grown mechanical in head and in heart, as well as in hand.’ ”⁴

In reflecting on the influence of technology on social interaction, Oldenburg has argued that modern society has lost many of its “third places,” places that exist for socializing outside of home and work.⁵ In the past, these third places, places like movie theaters, neighborhood pools and health clubs, churches, and so on, played a valuable role in community interactions. Because individuals with similar interests once gathered in these physical locales, there were many opportunities for informal social encounters; one might strike up a conversation with another about the plot of a movie, or about their diving techniques.

However, recent technological advances threaten the existence of many third places. Movie theaters still exist, but many people choose to watch films on cable television or videocassette. Health clubs still exist, but the cost of exercise machines has dropped to a point where many people can afford home fitness centers. As more innovations migrate into homes, we risk losing many of the informal interactions that once took place in shared social settings.

One goal of our research is to use computation to establish new types of communities for social interaction, to create a new type of “third place.” We are not suggesting that physical third places can be replaced by virtual settings, but the on-line world may present new opportunities for collaboration. Many communities of shared interest already exist on-line,⁶ and various communications technologies like chat rooms and www forums can be thought of as third places, informal spaces for playful engagement with others. Indeed, technology can often alleviate issues related to physical communities. For instance, most people feel connected to a number of distinct social circles (e.g., extended families, school groups, religious and ethnic groups), but these communities may not be physically collocated. Much of the interaction that resulted from individuals meeting in a physical location can be reconstituted on the Internet. We suspect that writing and editing can be used as the anchor for fostering a community and providing a structure for continuing growth of individuals and the community as a whole.

What is a community? Throughout this paper, we refer to groups of writers as “communities,” therefore, we need to discuss the meaning of the term. In particular, we need to consider the features that define a community, and more so, a healthy community. This will serve as the basis for further discussion of the groups that we have worked with.

Several definitions of community can be found in the social sciences literature. For instance, Sarason⁷ described three properties of a community: its members have a perception of similarity to others in the group; they acknowledge an interdependence among members of the group; and the members feel that they are a part of a larger dependable and stable structure. These criteria do not necessarily refer to a spatially collocated collection of individuals, although people in a town or neighborhood often fit this description.

McMillan and Chavis⁸ refined Sarason’s definition by emphasizing four main characteristics that distinguish a community:

- *Membership*—members have a feeling of belonging.
- *Influence*—members have a sense that the group matters, that as a group they can make a difference.
- *Fulfillment*—the association with the community must be rewarding for its members. “A strong community is able to fit people together so that people meet each other’s needs while they meet their own.” Shared values make it possible for communities to provide the necessary balance of priorities to be successful at meeting members’ needs.
- *Emotional connection*—in particular, members have a shared history.

McMillan later reformulated the four characteristics⁹ as:

- *Spirit*—a setting where we can have connections to others, but where we can be ourselves. There should be a sense of “emotional safety,” “boundaries,” and a “sense of belonging.”
- *Trust*—there should be some sense of order. We know that some in the community have more power than others, but we acknowledge and trust that structure.
- *Trade*—a sense of how members benefit from one another and the community. The ideal is to “transcend score-keeping and . . . enjoy giving for its own sake.”
- *Art*—“a shared history that becomes the community’s story symbolized in Art.”

Jacobs,¹⁰ Oldenburg, and Sarason are among the many voices in the fields of urban design, sociology, and psychology who point out that when changes—physical, political, or social—are to be made in a geographic community, it is important for community leaders and social scientists to evaluate the impact upon the community—to design the changes to minimize the negative and maximize the positive effects on the community.

McMillan’s characterization of community provides some guidelines for structuring on-line environments to support and enrich social interaction. An ideal environment would be one where community members could participate because they feel that they belong. It would provide a sense of security and emotional safety. Members of the community could

establish some form of order if they chose, but all members would have opportunities to make contributions and share the benefits of those contributions. And finally, there would be an opportunity to explore their shared history through some form of expression—in the communities that we describe, this means narrative and photography.

Community narrative. Traditional news coverage focuses on events of great political, economic, and historical significance. We are more interested in the stories that individuals have to offer, stories of life experiences and local events. When people express their personal recollections, their stories become relevant to other members of their community who share a common history. Our own stories and those of our *neighbors* put a human face on these otherwise impersonal events.

Storytelling is a developmental and communal activity, and some have gone so far as to suggest that it is the fundamental way that humans learn.^{11,12} McAdams¹³ builds on Erikson's theory of human development¹⁴ to describe how individuals construct their personal and collective identities through a narrative process. "The stories we create influence the stories of other people, those stories give rise to still others, and soon we find meaning and connection within a web of story making and story living. Through our personal myths we help to create the world we live in, at the same time that it is creating us." McAdams maintains that beginning in infancy, we start to collect images, symbols, and attitudes (hopefulness, optimism, pessimism) from which we later fashion our personal myths. In adolescence, we use our arsenal of images and symbols to try to formulate meaningful answers to the cosmic ideological questions that are awakening in youthful minds. In adulthood, we try to give meaning to the lives we are living and, as we grow older, we struggle with the myth's denouement and strive to leave a legacy that will survive us. McAdams argues that we create our identities, our personal myths, much as we fashion stories. We build upon the characters that we have internalized and we use them—the images and attitudes of our personal myths—to give meaning to the events of our lives. This continuing activity of building stories of personal history and meaning is not a solitary activity. McAdams emphasizes that individual stories are interrelated with the stories of other individuals.

The state of community on the Internet. It is beyond the scope of this paper to provide an exhaustive guide

to Internet sites that claim to create, support, or target communities, but we will give a selective review of sites that are based on community ties—geographic, demographic, or virtual.

The earliest forms of communities of interest on the Internet, the newsgroup and the "listserv," are still among the most successful forms of electronic community and they serve to illustrate that communi-

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cation is the most important feature of Internet technology directed toward communities.

Geographic communities. The Community Network movement began in the 1970s. A project called "Community Memory," begun in the mid-1970s in Berkeley, California, was perhaps the first attempt to create a computer network within a geographical community.¹⁵ It, and many of the community sites that followed it, were bulletin-board systems with a text-only user interface. Most were community-supported projects that offered free access to the service via a local dial-in phone number.

One geographic community that has a very successful presence on the www is the Blacksburg Electronic Village^{16,17} (<http://www.bev.org>). Blacksburg Electronic Village began as an attempt to share some of the computing resources of Virginia Technical Institute with the citizens of Blacksburg, many of whom were students, faculty, or staff of the university. Today it is a collaboration between the university and private community resources.

Researchers at the University of Tampere, Finland, run several neighborhood projects in the Tampere and Oulu regions.¹⁸ These Web sites are public-service-oriented—they are used to distribute relevant information within the communities and engage community members of all ages in moderated dis-

cussions, storytelling, and contests (<http://mansetori.uta.fi>).

Shaw's Multi-User Sessions in Community^{19,20} (MUSIC) project applies social constructionist theories to the creation of technology that supports real-life activism and participation within a local community. MUSIC is used to help organize face-to-face interactions among community members.

The developers of KOZ.com—"Reinventing Communities On-Line"—sell "Community Publishing System" software that allows communities—towns, schools, alumni groups, extended families—to create Web sites for their community (<http://www.koz.com>). From their main page there are links to many sites for small communities, schools, and organizations. Planet Alumni (<http://www.planetalumni.com>) provides free site hosting for high schools, colleges, and fraternities and sororities. The sites are used for alumni to keep in touch, for organizing alumni events, and to post alumni news.

Virtual-community sites. Sites such as Geocities (<http://geocities.yahoo.com/home>) and its imitators claim to be creating an electronic community by offering free hosting for individuals or groups who want to create their own Web pages. These sites are organized into thematic neighborhoods. With the exception of "monitors" who are available to other members for advice, few of the members of these neighborhoods are in contact with each other—it is hard to imagine how these loosely related sites could form a community. Another popular site, theglobe.com, allows people to start or join "clubs" in order to "meet people who share your interests" or to "debate, flirt, ask questions, get support, [or] speak your mind." These clubs are little more than a Web wrapper placed around threaded e-mail discussions.

Chat rooms and virtual worlds are on-line sites where a community of people meet much as they might in a real-life social setting. AOL (America Online) chat rooms, the Palace (<http://www.electroservice.com>), MUDs (multiple user dialogs), and MOOs (object-oriented MUDs) allow people to meet and chat and in some cases, in the MUDs, to build projects together. (See Musenet for links to some educational MUDs: <http://www.musenet.org/>.) These are probably the most social in the sense that users of the site actually communicate with each other. The collaborative community-building aspect of some MUD sites offers rich possibilities for interaction among the users and for forming communities. But in the many

sites that rely only on chat, the contacts are ephemeral and often shallow.

Forum sites such as Delphi.com (<http://www.delphi.com>) allow visitors to create discussion forums for their own organization or group. Most of the forums are formed around topics of interest such as investing, sports, or religion. Lusenet (<http://greenspun.com/bboard>) is a site that supports threaded discussions and Q&A (question and answer) forums as a free service for Web publishers.

Demographic-community sites. Web sites that are based upon a demographic community are growing in popularity. Some examples include SeniorNet (<http://www.seniornet.com>) and Third Age (<http://www.thirdage.com>) for older adults and Women.com Network (<http://women.com>), iVillage (<http://www.ivillage.com>), and many others for women. The best of these sites encourage participation from their readers, who contribute stories, pictures, and letters and create a participatory community atmosphere. The worst are simply a form of highly targeted programming with little opportunity for interaction.

Ethnic or political communities. There are some Web sites based on an ethnic or political community that try to pull together a geographically scattered group of people to support a common cause or to reinforce an ethnic identity. One excellent example is a Web site on Kurdistan (<http://www.akakurdistan.com>). This site relies heavily on stories and pictures from readers and emphasizes the shared history and community of Kurds, although the individuals contributing material to the site are usually not in direct contact with each other.

Sites for telling stories. Based on a series of digital storytelling festivals held since 1995, Abbe Don organized a digital story bee in February 1998 in San Francisco. The results are posted on her site, *Bubbe's Back Porch* (<http://www.bubbe.com>). *The Fray* (<http://www.fray.com>), also based in San Francisco, is a site built around storytelling. Readers are invited to send stories. Other story sites, such as San Francisco Stories (<http://www.sfstories.com>), are filled with stories by their authors but allow no interaction with visitors to the sites.

Other Web-based publishing tools. There are numerous publishing and groupware tools being used by community sites. One of note is Userland's Manila (<http://manila.userland.com>). Manila is an application that allows groups of writers, designers, and

graphic artists to manage Web sites through an “easy-to-use” browser interface. Content is separated from form—designers edit templates independent of authors creating stories. Manila supports a simple publishing model that includes a managing editor, contributing editors, and members.

Other storytelling tools. There is considerable research in the fields of both community building and narrative. However, less attention has been paid in the

Participants use narrative and images to explore meaning in their own lives and the shared history of the community.

field of electronic communication to studying how narrative can be exploited to build richer forms of communication, particularly ones that support community life.

Bers’ Storytelling Agent Generation Environment (SAGE) and Kaleidostories^{21–23} projects are of interest because both used narrative tools to allow participants to explore issues of values and identity. SAGE concentrates on individuals, but Kaleidostories involves collaboration among a group of geographically dispersed participants. Endter’s Community Memory project²⁴ examines the role of storytelling and shared history in strengthening community bonds. Endter uses an electronic “scrapbook” as the mechanism for sharing stories and photographs among two dispersed communities: members of a widely dispersed extended family and members of a high school reunion class.

The Silver Stringers

The Silver Stringers^{25,26} project began in 1996 with a group of senior citizens in Melrose, Massachusetts, and subsequently has spread to many neighboring communities. The intention was to experiment with a new community-centric approach to news coverage and presentation, to train and equip members of a group to be reporters, photographers, illustrators, editors, and designers of a localized WWW-based publication. One goal of this work was to help a com-

munity of news consumers become engaged in producing their own stories of interest. A second goal was to create an environment for collective activity, learning, and collaboration among the members.²⁷

As its name implies (silver refers to gray hair), the project began with a population of older adults. Realizing that people over the age of 50 have a vast store of history, wisdom, and connection to their communities, we attempted to tap those strengths to develop new paths for community journalism. The collaborative and social aspects of the project were intended to help reduce social isolation and to provide older adults with meaningful and rewarding opportunities to be active and valuable members of their communities, as well as enriching themselves by continuing to learn new skills.

As the project has progressed, we have investigated a number of social changes: for instance, the learning styles of older adults, attitudes toward computer technology, and the use of technology to enable community journalism. One interesting aspect of the work is the opportunities that participants have to use narrative and images to explore meaning in their own lives and the shared history of their community.

The Melrose Mirror. Most of the original Silver Stringers had never used computers before, and, of the two or three who had been exposed to computers in a workplace, none had ever used the Internet. So the approach to using computers had to be simple, straightforward, and easy to maintain. The software developed for this project, the Pluto system, was designed to automate as much of the publishing process as possible.

In the summer and fall of 1996, 14 journalists produced 28 submissions for the first edition of *The Melrose Mirror* (<http://silverstringer.media.mit.edu:9000>). Of these, two articles covered current events in Melrose—one story involved the celebration of the 150th anniversary of the Sisters of the Holy Child Jesus and included some history of the order and its work in Melrose. Twelve submissions were poetry rather than narratives, with half of these poems relating personal stories. Travel was a popular topic (six articles), as was personal commentary (five articles) on topics ranging from national politics to the Bible to neighborliness in Melrose.

Creating each issue of *The Melrose Mirror* provides opportunities for individuals to learn from and collaborate with others. At a recent meeting, one of the

Figure 1 From *The Melrose Mirror* series on the Great Depression

The Great Depression

The Melrose Mirror

One solution to Depression woes...

by Russ Priestley



SO WE WENT TO FLORIDA:
“The Depression? In the early ‘30s,” Russ Priestley explained, holding a tattered photograph, “our family traveled each year during our father’s vacation. Each evening we rented an overnight cabin, forerunner of today’s motel. They were simple and basic, as you can see in this picture taken by my father. This small room held the Priestley family of seven for the night, on our way to Florida. I think we paid \$2, maybe \$2.50. In the rear is my mother Olive, and in front, from the left, are me, Warren, Rob, Olive Marie and Gil. My dad often told us that it was as cheap to travel as it was to stay at home. So we went. Right through the Depression.”

September 4, 1998

members pointed out, with great pride, that the series of articles on Victorian homes in Melrose involved nearly everyone in the group. Several members conducted architectural research on the homes. At least two members went through Melrose taking the photographs, while another created a map of the houses. The author of the main story received comments and advice from several editors. Another example of teamwork involved a poem written by one of the group’s wittier members. A second member of the group, a composer, contributed a score for the poem. A vocalist in the group offered to sing the tune, and it was recorded and placed on the site. Finally, the group’s cartoonist created illustrations for the poem/song.

As the Silver Stringers collaborate to articulate their stories of the past (see Figure 1), they seem to experience a tremendous amount of personal growth. One contributor began writing stories about his life during the American depression, his days of “riding

the rails” from town to town. He had never been a professional writer, nor had he ever considered himself capable of writing. Once he began writing his stories, it became clear that he had a unique talent for storytelling, so much so that he is now preparing his *Melrose Mirror* stories for a book publication. Other members of the Silver Stringers have also discovered talents and interests in writing, photography, historical research, and, in a number of cases, computer programming.

In the last four years, the original group of 14 has more than doubled, and nine of the original members are still active. Today, the *Melrose Mirror* staff includes two former Melrosians living in Florida and California who participate remotely. During their tenure as reporters, their writing styles have matured, new talents have emerged, and the number of stories about personal life have increased. The publication is divided into 16 sections, eight of which can be characterized as personal narrative, personal re-

flection, or an exploration of shared history (see Table 1). For example, only 32 of 127 articles (25 percent) published in 1999 can be described as objective reporting or notices about current news or events; the remainder are stories of “legacy”—personal stories, reflections on the world, or community history. The Silver Stringers have invested a great deal of effort in learning writing and computer skills to create and present their stories to a wide audience and preserve them for posterity. *The Melrose Mirror* and its sister publications (see Figure 2) exemplify the urge that many older adults have, a need to generate a legacy from which future generations may learn. Says Kay McCarte, one of the founding members, “We don’t see this replacing newspapers, but it lets us be involved in the creative process. It gives us a voice.”²⁸

What we see in the Silver Stringers is a group of older adults embracing technology for a purpose—creating stories of their lives and communities for others to learn from. More so, stories are ways for them to make sense of their life histories, to reconcile a multitude of experiences into coherent narratives. These narratives may help them gain a new sense of identity, a sense of the essential truths about their journey through life.¹³ As well, the collaboration that occurs during the creation of *The Melrose Mirror* plays a valuable role in reducing the isolation that older adults often experience. More so, the Silver Stringers have formed a community that writes together but also learns together. Without the collaboration that occurs during the editing process, it is unlikely that these individuals would have discovered their talents as writers. By creating a “safe,” but structured, environment for experimenting with journalism and computing, they have overcome many of the frustrations associated with mastering new tasks. Editing, and the social interaction necessarily coupled with it, is fundamental to active information production.

The Junior Journalists

In 1998, the MIT Media Laboratory hosted an event called the Junior Summit, an effort to “identify and address such issues as child rights, telecommunications access, individual privacy, personal health, environmental responsibility, and world peace, through the eyes of those not blinded by the past and destined to live in the future.”²⁹ Around 3200 children from 139 nations participated in the initial part of the Junior Summit, an on-line discussion of the issues facing children (e.g., education, environmental

Table 1 The sections of *The Melrose Mirror*

Personal Reflection	General Interest
Looking Ahead	Melrose Centennial
Travel	Letters to . . .
Poetry	Movies
The Great Depression	Art
Random Thoughts	FAQ
Tales of the Open Road	Features
Remembering World War II	Food/Recipes
Saving \$\$\$ in Retirement	City of Homes

concerns, child labor) and how digital technologies might be used to alleviate some of these issues.

After discussing these concerns on line for two months, the Summit participants elected 100 representatives to come to Cambridge, Massachusetts, for a week to meet with Media Lab faculty and world leaders. This face-to-face meeting was meant to help them turn their ideas into action, to help them develop strategies for changing the situations they identified during the on-line discussion. One of the projects they considered was a publication to inform the world about their efforts and progress made toward reaching their goals. We showed them the Pluto tools that the Silver Stringers had been using, and 15 Summit participants agreed to use the software to create what would become the *Junior Journal* (<http://journal.jrsummit.net>). In November 1998, these children created a prototype newspaper that would eventually become a monthly publication involving 58 children from 34 countries.

The social organization of the *Junior Journal* is very different from that of *The Melrose Mirror*. Since the participants are scattered around the world, they conduct all the logistical planning and organizing of new issues entirely through e-mail—there are no opportunities for face-to-face collaboration. They discuss ideas for new stories, special editions, and policy issues concerning the management and design of the publication. These discussions are moderated by the “edition editor,” a position that rotates monthly among the original 15 members.

Each month, the edition editor consults with writers and editors to make decisions about the issue’s theme and front page design. He or she rallies the contributors and asks for stories to be submitted. Once people commit to writing stories, the edition editor reminds, cajoles, and sometimes scolds writers to make sure that articles are completed. He or she then assigns editors (two for each story) to iteratively re-

Figure 2 From the *Satter-lights* series featuring stories about active seniors. The *Satter-lights* is another Silver Stringers publication, created by a group of seniors in Revere, Massachusetts.



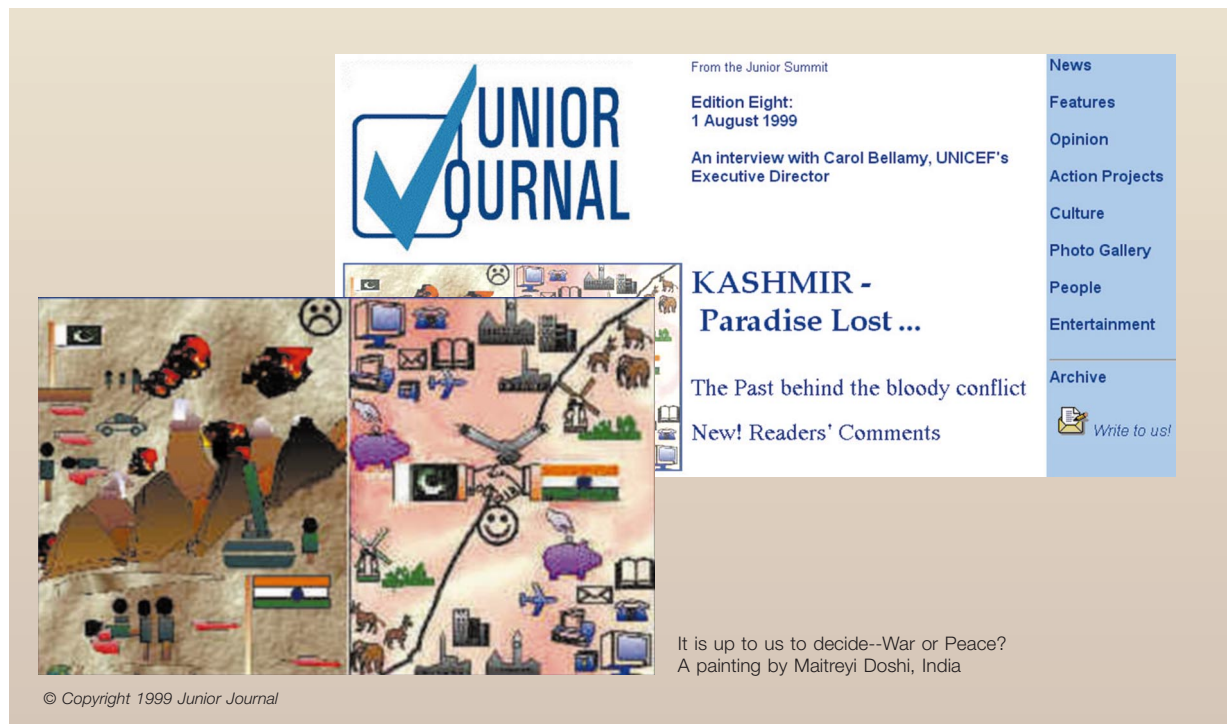
fine articles with writers before the deadline at the end of the month.

Adult mentors provide help when the writers need feedback on story content or technical assistance with the software. The adults rarely intervene in the process, as it is crucial to make the children feel that they own the publication, and the end product is their own achievement. What is interesting about their work for the past 18 months (as of June 2000) is that they have continued to develop and change their paper. It is important to note that they are not doing this for school credit—they have remained involved in the activity because they are committed to creating a voice for children to express their concerns about the world. It is also important to note the di-

versity of the participants—again, 58 children from 34 countries participated in the policy and planning discussions, and 50 of these participants have submitted articles for publication.

There are differences between the articles found in the *Junior Journal* and *The Melrose Mirror*. In the latter, older adults create stories of legacy, tales chronicling their life histories. In contrast, the *Junior Journal* is an expression of ideology, the voices of children asking adults to stop and think about how their actions affect the future of the world. For instance, the August 1999 issue of the *Junior Journal* (see Figure 3) contained 15 articles, three photo features in the Photo Gallery, and some letters to the editor. Three stories focused on the conflict between India and

Figure 3 The front page of the August 1999 edition of the *Junior Journal*



Pakistan over Kashmir (including one written jointly by two girls from Pakistan and India). Eight more articles featured UNICEF's (United Nations Children's Fund) mission (an interview with Carol Bellamy, the executive director), literacy, street children in São Paulo, Brazil, the life of Ann Frank, a benefit for a children's hospital, the International Education and Resource Network (I*EARN) conference (which one of the Junior Journalists attended), the story of a river and its environmental past and future, classical dance in India, plus one photo feature of historic architecture in Lahore, Pakistan. The remaining articles reflect the types of things that children typically think about: photos and poems about pets, compilations of "amazing facts," family vacations, and an unusual story about the medicinal uses of gems.

Nevertheless, an overwhelming number of stories deal with ideology, exploration of children's own and other cultures, and ideas and projects directed toward changing the world. They are exploring their own identity and their place in the world. According to McAdams, "We first become self-conscious myth-

makers in our late-adolescent years, when we confront head-on the problem of identity in human lives . . . A fundamental challenge in mythmaking in adolescence and young adulthood is to formulate personally meaningful answers to ideological questions so that one's identity can be built on a stable foundation."¹³ The Junior Journalists, like their Silver Stringer counterparts, have formed a community that writes together but also learns and develops together.

The Pluto system

Both the Silver Stringers and Junior Journalists author their stories using Pluto, a tool specifically designed to support collaborative Web publishing. The initial design was created for the Silver Stringers and other senior citizens; that is, it was developed to allow people with little or no computer experience to create Web publications.

Pluto's task structure resembles that of the publishing process seen in the newspaper industry. Before an author can post an article to the Internet, he or

Figure 4 The Pluto system



she must first engage in conversation with a collection of editors. Each article that an author creates is submitted to “baskets” that have associated access and functional controls—as an article moves through the publishing pipeline, it is repeatedly passed between an author’s personal basket and the editor’s basket before being published to the Internet.

In addition to creating and managing content, community members use Pluto to describe the structure and layout of their site. Page templates are used to express the “look and feel” of different parts of the Web site (front page, section pages, and the articles themselves). Default templates can be modified by the editors in order to design the Web site. As the editors become more comfortable with the system, they can create new templates “from scratch.”

Each contributor accesses the Pluto system through a personal page. A member logs into Pluto using a link on the front page of the public Web site. From their personal page, members have a choice of composing stories in their personal baskets, attaching images and other media objects to their stories, and sending stories to the editors for review, revision, and eventual publication.

The editor’s basket is visible to the subset of the community members who have been designated as editors. This basket is the container for stories that are being reviewed and revised. From the editor’s bas-

ket, stories are either sent back to the writer with comments for changes or published on the Web site under a specified section and using a selected page template.

Pluto is written in Java** code with portability and modularity in mind. The system consists of a data server and servlet server (see Figure 4). The data server handles the back-end functionality of the system. It consists of an object store, name and directory services, and a Scheme interpreter. The object store is a database that utilizes Dtype dynamic data structures for storing Pluto media objects. Dtypes are a simple network protocol for exchanging LISP-like objects.³⁰ They were designed for situations where there is routine use of data structures with complex interconnections. They include basic elements such as numbers and text arrays as well as extensions to special-purpose data types. The protocol is easy to implement, has low computational overhead, and is low-bandwidth, extensible, human-readable, and robust. (There are other protocols that would allow this kind of interaction as well [e.g., XML: Extensible Markup Language] that were not yet available at the time Pluto was developed. What is important is not that the communication protocol be Dtypes *per se*, but that it support arbitrary and nonpremeditated interactions.)

The Dtypes approach provides a lightweight yet powerful implementation for storing Pluto objects. However, a more robust implementation for database transactions (as implemented in a follow-on version of Pluto) is needed to support high-volume sites.

The servlet server includes a page generator that requests data objects from the data server and creates pages dynamically, using templates that have embedded Scheme code. Pluto also functions as the HTTP (HyperText Transport Protocol) server for page requests. This enables dynamically generated content, including form processing. The same server is used both to display the contents of the Web site and to provide the interface for collaborative publishing. The page template creation mechanism needs to be improved—currently, it is very difficult for publishing communities to design the initial “look and feel” for their Web sites.

Thinking, learning, and debate

When the Silver Stringers and Junior Journalists work with the Pluto tools to create their publications, they are also learning and developing in interesting

ways. The editorial processes created within each group structure individual writings, but they also establish a set of cultural norms for communication and debate. For instance, by forcing all stories to go through intensive editing, the participants are required to engage in critique and iteration. The journalistic process suggests “rules” for commenting on articles, for integrating criticism into stories. We suspect that these rules help the participants reflect on what it means to be a journalist. By creating their own stories in these editorial contexts, they are developing new opinions about what it means to present and disseminate information to the public. This gives them insight into their own abilities to create stories, and it may also make them more critical of the traditional press, because they now understand the “secrets” of publishing for an audience.

Ultimately, we are interested in knowing more about what these groups are learning as they create their on-line newspapers. The word “learning” traditionally suggests studying individuals in isolation or in controlled, laboratory contexts.^{31,32} That is, the researcher tries to isolate the individual from his or her social and cultural surrounds to measure competence in some area (e.g., writing abilities). One can imagine delivering a questionnaire or test to our journalists to ascertain if they had become better writers as a result of developing stories for their publications.

But such tests would not necessarily gauge whether the participants had become more critical about the media and whether they had grown and developed as content producers. The traditional methods of measuring individual competence are not suited for understanding community development. Our journalists are not isolated individuals; they have created rich cultures and their growth is a result of participation within a social context of media production. Moreover, when individuals participate in shared activity, they are not only developing new ideas for themselves, the collaborative process is transforming and shaping the organization of the community as a whole.^{31,32} So rather than thinking of learning and expertise as a body of acquired skills and knowledge unique to an individual, we adopt a more “situated learning” perspective,^{32,33} where the unit of analysis for expertise is the community itself.

In particular, Rogoff suggests analyzing community learning on three, interrelated planes: apprenticeship, guided participation, and participatory appropriation.³² That is, when studying learning in the con-

text of everyday activity, it is necessary to consider: (1) how learners are apprenticed into practice by more experienced partners; (2) how individual interactions contribute to the evolution of a community; and (3) how both of these lead to individual growth and development. In this section, we consider our journalist communities in light of these three planes to illustrate their engagement in the process of news production.

Apprenticeship. The metaphor of apprenticeship has been applied to many learning situations where newcomers to a community advance their skills through participation with expert practitioners.^{34–36} In particular, studies of apprenticeship examine how experts structure and support activities for novices, helping them to understand institutional goals and practices. Experts bring novices into their “zone of proximal development,”³⁷ the stage where new participants are unable to perform activities on their own but flourish as a result of having knowledgeable partners assist them in developing their skills.

In our case, a member of our research team (Driscoll) is a career journalist, and he serves as the lead mentor for both the Silver Stringers and Junior Journalists. From the beginning, he engaged the participants in the art of journalism: how to conduct interviews, how to edit a story to make a point, how photographs can add to a story, and so on. The focus was always on storytelling rather than on the use of computer tools. That is, the community members did not receive training in word processing or how to use digital cameras. They ultimately learned how digital tools could enhance their storytelling, but they first learned to master writing and the editorial process.

Apprenticeship occurs in practice, as the journalists are engaged in creating their on-line publications. Rather than separating instruction from actual practice, the journalists are encouraged to create, and they receive feedback as we notice them struggling with issues. Typically, this feedback comes during group meetings (for the Silver Stringers) or as e-mail “tutorials.” For example, the tutorial below is a response to a submission by one of the Junior Journalists that lacked background information necessary for a reader to interpret its meaning.

ONE-MINUTE TUTORIAL . . . On Reporting (#5)

The key to good journalism is context or perspective. Since many of you are about to launch into

the reporting of a story for the May edition, let's examine the difference between a story that results from "emptying your notebook" and "synthesizing" the material you have amassed.

As an example, take a subject fresh in our minds: child literacy. If you did a story on a girl from your country who was illiterate at age 12, it certainly would make a readable story. However, it would also be vital to include other elements, such as: what is the rate of illiteracy in your country? How does it compare with worldwide statistics or with countries of similar size or of neighboring countries?

Good enough? No, because those statistics wouldn't have much meaning, unless you could give a snapshot of progress or lack of progress. What was illiteracy like ten years ago? Twenty years ago?

Still, statistics don't tell the whole story. Some say there is a tie-in between government funding of education and literacy. Some say there is a close connection between infant mortality and illiteracy. And so on. You need to examine the causes or influences that create a certain effect or outcome. Cause and effect . . .

When you report a story, keep moving your telescope in and out: get the closeup story, the close-in detail, but also draw back and get the big picture.

In the end, the biggest question you need to answer in your reporting is: Why?

These "just-in-time" commentaries, whether delivered by e-mail or in person, instruct community members on journalistic practices. Because they come from an expert, they are taken seriously, and we see participants adopting these lessons in later writings. In this way, we apprentice our communities into expert practice.

As our communities have become more accustomed to writing and editing, certain members have taken on mentoring responsibilities, allowing us to gradually fade our presence. For instance, the Silver Stringers have been teaching other local senior groups to develop their own on-line publications without our assistance. And the Junior Journalists have welcomed new writers, using frequently-asked-questions (FAQ) lists to inform them of their responsibilities as part of the community. Over time, the

novices have become experts, and we have observed the communities assuming responsibility for teaching new participants. Because we have been able to reduce our support, we suspect that they have learned enough to become self-sufficient. We rarely need to intervene at this point because a critical mass of community members has acquired expertise and taken on our advisory roles.

Guided participation. Rogoff introduced the term *guided participation* to refer to the mutual involvement of individuals and community members and the ways that they communicate and coordinate joint activity.^{32,34} "Guidance" refers to the direction and instruction offered by peers and the social practices and values of the community.

For example, one member of the Silver Stringers is responsible for providing coffee and cookies to the others during their editorial meetings. Although she seems to passively observe most of the conversations, she is still an active member of the community, playing an important role in guiding the discussions and the format of the publication. During her rounds to make sure that each coffee cup is filled, she offers suggestions and comments to the primary group, many of which are taken seriously by the other participants. While everyone acknowledges that she is in charge of refreshments during these meetings, they also understand that she produces many of the best ideas. Rather than sitting at the table and being an active leader, she feels more comfortable staying at the periphery of activity, but she still makes enormous contributions to the publishing effort, as she opens another package of cookies.

Since the Junior Journalists do not have the luxury of meeting face-to-face, their "business meetings" take place through e-mail. We often see hundreds of messages exchanged each week as they determine the content of their next publication. Two types of conversations seem prevalent—those about content and process. In the content conversations, journalists debate the directions for future issues, question the writings of others, and suggest articles for others to author. Content messages, like the one below, shape the format of the publication:

In keeping with the theme, "time and life" I was thinking of a cool idea . . . you know how Time magazine recently decided on the top/best/most influential people of the century? Well, I was thinking that as a long term project over the rest

of this year, I'd like to coordinate in Junior Journal so that we can:

- 1) have a survey of young people to identify who the most influential people of the century are.
- 2) invite young people interested in the area to write about the people, or alternatively have our journalists interview them.

There are also arguments about structure and process. In these messages, the organizational practices of the community are called into question, typically resulting in a flurry of e-mail supporting or debating the proposed policy change. For example, an argument ensued over nominating a particular writer to the editorial board. One participant began by questioning the qualifications of the nominee, stating that editors require expertise to perform their tasks:

About new nominations:

My aspect is that it is necessary before we decide for someone to see a sample of his work and not only his criticism, to see how consistent he is in his work, what he can offer to the JJ, the quality of the work (since many of you proposed this a month ago and therefore there was a long discussion about the quality of the articles).

Furthermore there is the technical part of the editing: that means that the person must be familiar to use Pluto (for example the articles after editing must be OK and not full of squares and question marks, not destroy the code for photos and for anything else, the lines and the paragraphs and many others).

We have overstepped the number of editors already. A big number of editors causes disorganization and anyway editors can't be more than reporters. What a newspaper needs is good writers and consistent and hardworking editors.

The next message came from another editor questioning this decision.

Then maybe it's time to reset those limits. This month is a teensy bit frustrating because not very many editors have confirmed.

So I propose a rule: Editors have to help out - if they don't for more than two months in a row they are no longer editors.

I'm sorry, I don't mean to be pointing fingers at anyone in this, but the fact of the matter is that the JJ needs consistent people that do the job they have committed to.

The editorial structure holds the *Junior Journal* together. There, a small number of individuals (15) assumes responsibility for making sure that articles are assigned, deadlines are met, and so on. While it is clear from the above message that more involvement from editors is needed to keep the operation running, the argument started with the assertion that certain standards of quality need to be adhered to when selecting editors. This debate would go on for many more messages, as the existing editors struggled to change the editorial process that had worked so well up to that point.

Finally, there are interactions with people outside of the publishing communities. The Silver Stringers get messages from readers asking for more information about their stories, people in Melrose, and how they achieved their fluency with technology. More often, though, they receive "fan mail" praising their local twist on news and storytelling:

Just wanted to say that your group is indeed an inspiration. I have two friends, both in their 80's, one who died last September and another who is still very active and they both caught the internet bug.

One always had her keyboard next to her, she had written messages and communicated daily on the net until the end. The other is very creative and her daily life at her center keeps her busy. Being connected to the Net allows her to delegate some of her responsibilities to others.

The net has been a blessing to so many seniors. They are surfing the net instead of standing in place.

The Junior Journalists receive similar messages, but they also have been questioned on their occasionally biased reports of world events. The age differences between the junior and senior reporters lead to very different types of stories being told. While the older group is more interested in leaving a legacy, chronicling the history of their community, the Junior Journalists often become "digital activists," writing about the impact of adult activities on children around the globe. For instance, in the articles

about the conflict in Kashmir, a Pakistani author wrote:

The State of Jammu & Kashmir is under brutal subjugation of 600,000+ Indian mercenaries, who are licensed to kill by the Indian Parliament. 60,000+ innocent people have been mercilessly butchered to death in the last 9 years in the Occupied Kashmir. There is 1 soldier for every 6 Kashmiris, the majority of whom are old men, women and children!

While it seems clear that the author was simply trying to set up an emotional plea for peace in Kashmir, the inherent bias and exaggerated claims led some Indian readers to respond with messages like the one below:

In the article, Atrocities: A nominal summary of the horrendous crimes and tortures perpetrated against the Kashmiri people.

{author name omitted}, Pakistan makes sweeping claims about human rights violations in Kashmir. I agree that there have been terrible things done there, but the author should say what info came from where -- not all the sources cited are equally reliable.

Also, it might help the cause of peace if he were to put part of the blame on the Pakistani government too, for sending mercenaries and their troops across the border to do some of these horrendous things. Not to mention training terrorists and hardcore fundamentalists. Some day, these people will return to haunt Pakistan -- we learnt that lesson when we trained the Sri Lankan LTTE, and they came back to kill Rajiv Gandhi and several others.

It is rare for children to get such criticism from adults. As mentors to the project, we allowed this story to be published, despite the biases that led to critiques like the one above. Indeed, we saw this as a valuable lesson for the Junior Journalists to learn; as journalists, they must be prepared to cite sources, and larger-than-life claims can lead readers to question a story's validity. While we could have said this from the beginning, it is probably more valuable to receive this sort of feedback from an actual audience.

Participatory appropriation. The impact of having a global audience has changed the ways our journalists fashion their stories. Which brings us to Ro-

goff's final plane of analysis, *participatory appropriation*. The concept of appropriation suggests people learn to engage in activities through active participation in similar activities with others. By interacting with others in a community of practice, individuals come to change through their contributions. In some sense, participatory appropriation deals with the ways that communities transform and reproduce themselves.

The Silver Stringers have been active in helping other groups of seniors create their own publications. While they occasionally publish articles from outsiders, it is not the norm. Rather than extending their writing circle to include people outside of their community center, they choose to instruct others on journalism and the Pluto tools. For instance, last year, several Stringers trained another group of seniors in the art of storytelling. These interactions led to the creation of another senior publication, the Danvers Senior Oracle (<http://danversoracle.media.mit.edu:4000>).

For the Silver Stringers, spreading their message means more than relying on people to come to their site and read their stories. It is also a matter of engaging others to begin chronicling their lives through Internet storytelling. Members of the Stringers have spoken with the traditional press and at research meetings at the Media Laboratory, trying to help others realize they also can have a voice on-line. As one of them told a member of the Danvers group during their training sessions, "You have stories to tell, and we're here to help you tell them."

The Junior Journalists have a different challenge, as their original charter was to be "the global newspaper for kids, by kids." After three or four issues, some of them decided that this vision was not being achieved. While it was a publication for children, they noted that their community was composed entirely of Junior Summit participants. Soon, there was concern over the lack of outside voices:

I think it's very important that we allow readers the *opportunity* to submit their work if they want to. Judging from the number of letters sent to the journal-info address asking how they can contribute, a lot of people are interested in this. They will eventually (sorry to say) get tired of just *reading* our paper - no matter how good we make it. After time they will want to have at least the opportunity to be able to submit something them-

selves, for consideration just as much as anyone else in our *team* could submit something.

This proposal did not go without critique. It is important to realize that there are only 58 active participants in the *Junior Journal* and that they are dealing with language and distance barriers. Some children argued that allowing anyone to contribute to the publication would become a logistical nightmare. It is difficult to maintain a sense of community when meetings are conducted exclusively through asynchronous communication. Many members felt that adding new participants to the e-mail lists would introduce noise and deteriorate the established social practices.

After much negotiation, one of the members came up with an idea to allow for outside contributions and keep the core community intact:

Here's what I suggest. We have a link on the front page for people who want to write to us - they click on "send mail" or whatever it says, up pops a pre-addressed letter to the journal-info, which then gets read and responded to by the editors. What if we had something like this for outside contributions? They click on something that says "Submit your work for consideration" (of course something much more creative than that), and up pops a pre-addressed message, where they type their name, age, email address, and writing for consideration. One or two people read this submission, tell the person that we've received their work and are considering it, and then pass it on for consideration into the upcoming edition . . .

Does this sound ok with everyone? It doesn't mean that we're OBLIGATED to use the work they send in, it just means that it gives them the OPPORTUNITY to send work in. Is this somewhat of a compromise between both sides?

This solution was adopted by the group and is still the way that outside authors are allowed to contribute to the publication. Since then, they have received a number of submissions from outsiders, some of which have appeared in the *Journal*.

The important thing to note is that this group of 10- to 16-year-old children had to deal with several problems. First, and perhaps most important, they had to resolve conflict within their organization. It meant realizing that compromise is, often, the only way to

solve problems within communities of practice. Had we been orchestrating conflict resolution, this would be less impressive, but, in fact, we had very little to say during the matter. Occasionally, we summarized the issues on the table, but we did little to produce the final solution. The suggestion that ultimately resolved the problem came from a community member, as such suggestions should.

A second point is that the group reached one of their first conflicts over their own evolution. This was not a simple argument about who should be the next edition editor or who is turning in stories beyond deadlines. What we see here is a community in flux; at this point in their development, many of them were ready to extend their walls beyond the Junior Summit participants. Others felt this would be a mistake—it could destroy the balance of their organization. Considering this in terms of participatory appropriation, we see the Junior Journalists trying to change but wrestling with the optimal path for growth.

Learning? In this section, we have discussed apprenticeship and individual collaboration, and how both of these contribute to changes in our publishing communities. None of these issues directly addresses questions about individuals. That is, we cannot say whether individual competence in writing has improved or whether conceptions of the popular press have changed through the process of becoming media producers. (However, a survey given to a group of 18 Silver Stringers suggests that editing now plays an important role in their writing and that their concept and consumption habits of traditional media have changed.) Rather, we have examined these journalists for what they are—storytelling communities where each individual contributes to collaborative dynamics and practices. During their tenure as journalists, the structure and organization of publishing activities have changed dramatically. As groups, they have learned and developed together, changing the purpose of the activity and individual roles within it.

Conclusion

A newspaper is a university.

—Rodrigo Mesquita

We have described two communities that have gone from reading news to producing it for themselves. The Silver Stringers have been publishing *The Melrose Mirror* since 1996. The Junior Journalists have

been writing a similar publication since 1998. By transforming consumers into producers, many stories that would have gone untold become part of a local, community memory. One Silver Stringer, who just celebrated his 86th birthday, has published 40 stories during the past two years. “[I] have concentrated on storytelling with my word-processor. I had been telling of my early experiences as part of the Walk About USA while wandering around the country and was persuaded to start writing about it. So, everything else has been pushed to the back burner, and all my energies are now directed to putting my experiences on paper.”

For the Silver Stringers, storytelling has become a way to preserve their legacies, to ensure that their life encounters will be seen by future generations. The Junior Journalists use their publication to present the playful attitudes of children, but they also expose their identities as teenagers, their concerns with the social and political events affecting the world. For both groups, on-line journalism has become a way to rethink their relationship with the communities that they write about. One of the Silver Stringers explained to us, “There is more context that pertains to my world, my community. We are finding more connections around the country, around the world, with whom we have much in common.” Similarly, one Junior Journalist wrote, “We’ve also disproved the fact that people can’t live on this planet without fighting no matter their ethnicities, color, religion and backgrounds, and despite that if any arguments arise, they can be dealt with peacefully, and no grudges are held.”

Creating news on a monthly basis has helped both groups change their views of journalism and the traditional media. The Junior Journalists, for instance, regularly scan Reuters news distributions, selecting some to accompany their articles, rejecting others as being “uninteresting” for their audience. One of the young authors stated, “I think the Journal has also made us wiser politically, and we are not as closed to opinions as we were before. We are more tolerant of other cultures and because of our closeness and friendship, we understand better what is happening in a certain country and don’t just eat up what is reported by the media in our respective countries, i.e., we’ve learned to question, and seek answers.” Some of the Silver Stringers have gone beyond their publication to confront the traditional media. For instance, many of them have written letters to the editor concerning stories they read in *The Boston Globe*. Over half of them say that they are

more inclined to write such letters as a result of their experiences writing for *The Melrose Mirror*. Engaging in the journalistic process has helped these communities develop a new understanding of news, what it means to engage an audience through narrative.

While creating and publishing stories is important, the socialization that occurs in these writing circles may be the most significant part of the activity. The collaboration that occurs around generating, editing, and critiquing stories bonds the individuals into tight communities of interest. For the participants, these news communities act as “third places,”⁵ places outside of homes, schools, and workplaces where informal discussions and learning occur. In their face-to-face meetings, the Silver Stringers have found new energy, a catalyst for generative expression. Quite simply, they report that they are having fun, and they attribute this fun to the social contact that they have with their peers. Despite the fact that they often deal with conflicting opinions about the newspaper’s direction, they have learned the art of compromise, and they find the challenge of redefining themselves exhilarating.

With little or no background in computing or publishing, both young and old have become competent Internet publishers. The Pluto authoring tools reduce the need for sophisticated, technical knowledge, allowing the news communities to focus on the important task of framing their stories for an audience. As writing becomes second nature, many participants begin to engage the technology itself. For instance, many of the Silver Stringers have discovered that programming is yet another means of expression, and they are currently learning the Java language to build their own systems. And the Junior Journalists have created a dazzling array of Web sites independent of their publication to highlight their individual interests in youth activism.

Over time, these groups have created virtual “third places” where the primary goal is the creation of stories, but along the way they can engage in informal conversation and learning. The Silver Stringers learn about the past with each other; the Junior Journalists learn important lessons about how to respect and nurture opinions from other cultures. As they have become active information producers, the members of these communities have found new places to express their voices and concerns about the world around them. They have gone from simply accepting what they read in the news to creating their own articles and questioning what they see in the pop-

ular press. Their learning continues as the publications move forward. One Silver Stringer in her late 80s asks, "Do you ever get to an age where you're no longer able to learn?" In the future, we hope to answer her question.

Future prospects. These projects suggest the emergence of a new kind of grassroots expression that will enhance democratic processes and challenge those that are not. Today, average citizens have access to computational tools that may rival the impact of the printing press. They have the means to tell their stories to large numbers of people near and far, and that ability changes the traditional relationship between consumers and traditional information providers. They no longer have to simply absorb the news that "experts" provide them. As they become part of the dialog, their expectations grow, and they want to see more from the media as they engage in the process themselves. In our future work, we will build on what we have learned in our observations of these communities to understand how:

- Communities can pool resources and learn from one another as new tools are developed to connect them with one another.
- Geographically separated individuals can form around topics of interest, especially retired professionals wishing to keep a hand in their specialty, sharing their accumulated wisdom.
- More formal liaisons with established media can evolve into beneficial relationships.

Finally, some questions regarding the active information producer remain only partially answered. What are the processes individuals and communities use to interpret and organize information? How do these processes help them to communicate and learn? How do these processes impact not just the creation of communities but also their long-term viability?

Acknowledgments

The authors would like to thank the Silver Stringers and Junior Journalists, without whom this project would exist only as an academic exercise. This work was supported in part by IBM and the MIT Media Laboratory's News in the Future research consortium.

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Accepted for publication June 14, 2000.

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