# Design and Implementation of An Electronic Special Interest Magazine

by

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## Abstract

Electronic publishing has been established as a unique means for providing information in an interactive and personalized manner. Although scholarly journals have been published electronically, large circulation magazines have not. The trend in these popular magazines towards more specialized content makes their electronic publication particularly attractive.

This thesis explores the possibilities for such a publication. A system has been developed which assembles and displays an electronic magazine containing both editorial content and advertisements of specific interest to an individual. Useful methods of interaction with the magazine are provided. The material is presented in a stylized and entertaining manner, in keeping with the nature of popular magazines.

Thesis Supervisor: Andrew B. Lippman
Title: Associate Professor of Media Technology

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To my parents

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# Chapter 1

# Introduction

## 1.1 An Overview

Electronic publishing typically refers to the synthesis of computing power and conventional mass media distribution systems, such as television, radio and print. The publications which arise from this combination are essentially new communications media, which exhibit novel forms and styles and allow for significant user interaction and personalization.

In the Electronic Publishing Group at the Massachusetts Institute of Technology Media Laboratory, electronic publication systems are developed under the assumptions that the majority of computer processing will occur locally, and that large scale local storage and high quality display equipment are available to the user.

This thesis is concerned with the design and implementation of an electronic special interest mass circulation magazine. The investigation is based on *Popular Photography*, but could easily be applied more broadly. Magazines of this nature are particularly suitable to electronic publication be-

cause they are increasingly concerned with reaching very specific audiences.

The implementation adopts the view that the editors and subscriber work together to produce a magazine that satisfies the requirements of a special interest group of one, namely the specific subscriber. The data, or magazine content, is sent by the magazine editors to the user. A computer program on the user's end holds the skeletal structure of the magazine within a set of rules, and locally manipulates the contents received to assemble the magazine. In addition, an alterable personal profile guides selection and ordering of particularly appropriate material for the user's unique edition. Once assembled, the magazine is presented for viewing on a touch sensitive display. The user is provided with a variety of options which allow the magazine to be examined in standard ways or in directions made possible by computer control.

In the past, electronic publications have often been criticized for poor presentation of material. The electronic adaptation of a highly stylized popular magazine poses an even greater challenge. Therefore, special consideration was given to the incorporation of design elements into this system, the goal being to preserve the entertainment value expected of this type of publication.

## 1.2 Organization

This remainder of this thesis is organized as follows:

Chapter 2 offers a brief history of magazines and their role within mass media. It also examines current and future trends in magazine publishing.

Chapter 3 presents an overview of relevant electronic publishing developments to date.

Chapter 4 contains a discussion of the design and functionality of the electronic magazine which was developed.

Finally, Chapter 5 presents a discussion of directions and possibilities for future work, and Chapter 6 contains a few concluding remarks.

# Chapter 2

# A Brief Look at Conventional Magazines

## 2.1 Origins

The word *magazine* derives from the French *magasin*, which means storehouse, or location for a variety of materials [19]. The word was first applied to French periodicals in the 17th century, which were basically catalogues of items supplemented with book reviews. In the 18th century, literary periodicals appeared in England and were circulated locally, and in the American Colonies. The first American periodical was conceived of in 1740 by Benjamin Franklin, but was not actually published until 1741.

Prior to the Civil War, magazine revenue came solely from subscriptions. Lack of interest on the part of readers and authors resulted in the death of most periodicals within a year of their initiation.

After the Civil War, magazine content gravitated towards non-fiction of general interest. Aided by the rise in both industrialization and literacy,

subscription rates were radically decreased and magazines achieved large nationwide circulations. This, in turn, attracted national advertising and the general interest magazine thrived.

The forerunners of today's specialized magazines also first appeared at this time. Due to increases in the public's education, leisure time, and buying power, public interests greatly diversified, thereby providing the impetus for publication of these magazines.

## 2.2 Modern Magazines

The demise of the magazine was predicted several times during the current century. After World War I, it was generally felt that the automobile would monopolize all leisure time, leaving none for magazine reading[10]. Later, radio and sound movies were assumed completely capable of replacing the medium. The wide scale acceptance of television during the 1950's was perhaps the most critical threat to its survival. However, responsiveness of the industry allowed the magazine to evolve into a unique medium, which has proved itself quite capable of survival.

### 2.2.1 The rise of the special interest magazine

Whereas the general interest magazine had previously flourished as the sole means of national advertising, the arrival of television all but completely destroyed this genre of periodical. Television offered nationwide coverage at reasonable rates, and advertisers simply found it too expensive to also buy pages in large run magazines. Only a few general interest periodicals

achieved substantial success, namely *Reader's Digest* and *TV Guide*. It was at this time that special interest magazines first became dominant in the industry. Through specialized content they sought to attract specific audiences composed of, for example, sports enthusiasts, hobbyists, or the fashion-conscious. These magazines provided the advertiser with a readership composed of potential customers. This arrangement proved beneficial to readers as well; they often found specialized advertising as interesting as editorial content on the same subjects[29,48].

### Regional and *Split-Run* publishing

Towards the end of the 1950's, in an attempt to rescue the national general interest magazine, regional editions, and "split-run" publishing were initiated. By including distinctive material in certain editions, even these general interest magazines became specialized. Advertisers were offered lower rates and access to unique markets based on geography, life-style or special interests. *Look* started its appropriately titled regional *magazone*, and *Time* instigated *demographic editions* which were geared towards specific groups such as college students, doctors, or businessmen[54]. In an extreme move in the opposite direction, the *Saturday Evening Post* sent letters to almost half of its subscribers in 1968, asking them to cancel their subscriptions. The *Post* hoped to eliminate all but the wealthiest of readers, which they could then offer to advertisers at a premium. However, the plan failed and the magazine died the next year[41].

### Technical support for specialized magazines

Recently, the large printing firm R.R. Donnelley and Sons developed a system to specifically aid publishers in producing specialized publications. The system, called Selectronic[1] Services, sorts and organizes distinct printed sections into customized periodicals, which address the specific interests of an individual, or a specific demographic group[13]. The system is essentially a computer controlled mechanical "binder", which employs a series of physical stations, each responsible for attachment of a certain section. It is used to produce individualized farm journals. A unique issue is pre-addressed to the particular subscriber and progresses down the "binding" assembly line, where, for example, the sections on dairy and cattle to which the individual has expressly subscribed are physically incorporated.

## 2.2.2 Characteristics of the modern magazine

The ability of magazines to attract special audiences is, perhaps, the element that most distinguishes them from other media. However, magazines have a number of other characteristics that are worthy of mention.

One study[23] found that both users and non-users perceive magazines to fulfill specific roles in society. Magazines were viewed primarily as providers of entertainment, and secondly as a means to learn more about daily life. Generally, magazines are seen to maintain a role within the media spectrum that falls somewhere between those of television and books[53].

[1] "Selectronic" is a registered trademark of R.R. Donnelley and Sons, Company, Chicago, Illinois.

Magazines, like most print media, require the active involvement of readers. A magazine that holds some interest for an individual must be consciously purchased, and content is only received through the deliberate perusal of each page. This is unlike television, where programming is often passively consumed due to failure to change the station[49].

The magazine is a continuing publication and is essentially received in "installments." As such, it provides a forum for discussion through the presentation of reader responses, and often undertakes projects that span more than a single issue and aim for cumulative impact[41].

Magazines tend to have greater permanence than television, radio or newspapers, but less than books. The average magazine reader examines a single issue on at least three or four different days[19], and *Better Homes & Gardens* has reported that 2.2 million of its readers save some portion of each issue for future reference[10]. A more generalized study by the Opinion Research Corporation showed that 72% male and 79% female readers tend to keep a magazine issue for future reference[5].

While a magazine is not as quick to report on events as either television or radio or newspapers, it can offer greater depth on a subject, and in a shorter period of time than required for book publication. In what has been referred to as the "information overload age"[51], a medium providing this service is highly desirable. An individual can receive the necessary amount of information on a subject from a certain magazine, and due to specialization, that magazine alone provides this information; no other magazine or medium exactly duplicates it. Television may even serve to support the magazine in this role[10]. Its light treatment of items often serves to stim-

ulate greater interest in viewers, who then seek more serious information through magazines.

Magazines are often strongly associated with the personality and opinions of the Editor-in-Chief. This is because, more so than any other medium, the magazine editor can have direct influence over every layout, every idea and every word that appears in each edition[10]. This prevalent editorial tone, in addition to subject matter, further defines a magazine's appeal to specific groups.

### Characteristics of the magazine reader

The majority of magazine readers tend to possess specific and definable characteristics. For instance, magazine readers are primarily of higher income classes, as individuals of higher social standing tend to read more, and assign greater credibility to printed sources[49]. Additionally, because these members of society possess large amounts of leisure time in which to cultivate special interests, they have greater use for a variety of magazines. In fact, approximately 50% of all users read at least four different magazines, while 32% read two to three, and a minority of 18% read only one[41].

A closely related finding indicates that magazine readers tend to possess a higher level of education. A magazine reader will typically have well over five years more schooling than the non-reader[41].

One source[49] views the most predominant characteristic amongst magazine readers to be their strong "sense of community." That is, readers tend to possess, or at least perceive themselves as possessing, a strong affiliation

with some special interest group. The associated special interest magazine commonly functions as a group leader and actually serves to hold the community together. The reader usually actively engages in subjects written about or depicted within the magazine's advertisements, or holds opinions that coincide with those of the editors. The magazine may be used to reinforce the reader's perception of social group membership. For example, reading a science-oriented magazine is often seen as an indication that one "belongs" to the scientific community.

### 2.2.3 Indications for the future

Increases in wealth, education and leisure time among Americans throughout this century have continued to produce a rise in the number of potential magazine readers. This, in turn, has succeeded in sustaining the magazine against competition from other media.

In recent years, while total magazine circulation has remained the same, the number of distinct magazines in existence has increased[10], supporting the claim that specialization is the dominant trend. Although many do not live long, well over 200 new consumer magazines have been introduced every year as of late[10]. Their success is ultimately tied to their ability to either anticipate the public's beliefs and tastes, or create them[52].

Industry predictions are that magazines will continue to grow into even more specialized media[19]. Recently, "publishing groups" that provide several small special interest periodicals have become prevalent[10].

In a statement about the future of newspapers that is equally appropri-

ate for magazines, David Lipman of the St. Louis Post-Dispatch has said he would not be surprised

> *... to see papers of the future evolve into a multitude of specialist packages aimed at particular segments of the audience...I believe technology will eventually make such products feasible for delivery either in printed form or on a television-type unit[45].*

This thesis adapts the television-type unit proposed to the special interest popular magazine. The implementation seeks to preserve the unique nature and style of this medium.

# Chapter 3

# A Survey of Electronic Publishing

Within this chapter, several applications of electronic publishing are described. The material presented does not attempt to cover the entire spectrum of systems developed, or even to completely describe every aspect of any specific system. Rather, the goal is to provide some background on the range of work done to date, and to raise issues of particular relevance and interest which were influential in the development of the electronic special interest magazine.

Electronic publishing first became attractive for several reasons. While standard publication's costs rose and the amount of material requiring publication grew, computer memory and telecommunications costs decreased. The computer's capability for handling information in multiple formats—ranging from sound to text to graphics—presented electronic publishing as a potentially more effective and interesting way to transfer information[17,55]. Above all, the incorporation of computer control provided opportunities for the development of new forms and styles of communication.

## 3.1 Online retrieval systems

Online retrieval systems constitute one of the earliest forms of electronic publishing. They are essentially conventional publications made available via centralized computer, and are typically equipped with standard and computer-enhanced methods for examination of the information. Online retrieval systems generally fall into one of three categories:

- bibliographic databases
- source databanks
- full text services

Bibliographic databases are basically "secondary publications", or reference materials, which have been computerized. Source databanks are typically numeric databases and contain items such as stock quotations and credit reports. Of greatest interest are the full text databases, which present entire documents "on-line."

Mead Data Central offers four full text databases: LEXIS, NEXIS, EXCHNG and MEDIS. LEXIS was established in 1972 and provides full text of all U.S. legislation and court proceedings, as well as some material from Europe and the United Kingdom[17]. NEXIS, established in 1979, is a news service which provides full text news stories from over 140 publications[28]. It effectively allows the user to acquire the "same story" on a particular subject from several popular United States newspapers and magazines. EXCHNG provides in-depth research reports on U.S. and international compa-

nies and industries, and MEDIS offers full text of medical journals, newsletters and textbooks[28].

These full text services allow key word searches, searches by date, and logical operations. Retrieved information can either be displayed in full, or examined in bibliographic or shortened versions. This ability to "browse" before requesting the entire document is a benefit commonly made available through electronic publication.

## 3.2 Cable Television and Direct Broadcast Satellites

Cable and Direct Broadcast Satellites are currently used to bring television programming to properly equipped homes. Cable TV, as the name implies, requires the installation of a cable for reception. Direct Broadcast Satellites relay television signals from a ground distribution station to a satellite, and then back to individual stations equipped with a receiving dish.

"Narrowcasting", or the transmission of programming of special interest to limited audiences, is made possible by the large number of channels these broadcasting methods can supply. MTV, which presents solely music videos and is geared at those under 35, is one example of such programming[14]. Similarly, entire cable stations are devoted completely to news, such as Ted Turner's Cable News Network, or even more narrowly, to only local news and information presented in a passive text scroll. In yet another case of "narrowcasting", a cable company broadcast the actual pages of

*Family Circle* magazine, supplied relevant audio and called the station "The Women's Channel"[21]. These types of electronic publications are non-interactive apart from channel selection, and the programming made available, although more specialized than standard broadcast fare, is not greatly personalized.

Cable TV does have the potential for greater interactivity and personalization. In addition to receiving a broadcast, a cable subscriber can transmit signals back to the broadcasting location. The first major system in the United States to utilize this capability was the QUBE service in Columbus, Ohio. The system, which was in use through January 1984, allowed subscribers to participate in "opinion poll" type programs, and order goods and services from local merchants through the use of a control pad[17]. Additionally, QUBE featured a special version of "narrowcasting" where certain programming will only be sent to specific homes. For example, a university could specify that a broadcast be sent only to its faculty members[45].

## 3.3 Videotex

Videotex is the general name for a group of systems based on transmitting data from a central computer for display on a standard television. If the data is received via broadcast, it is referred to as *teletext*. If it is transmitted through phone lines, the service is designated *viewdata* or *interactive videotex*.

The visual design of these systems is of great importance, and involves

consideration of the technical capabilities and limits of television as a display device. Effectiveness of these systems is ultimately linked to relevant and supportive visualization of the contents[2]. Early systems developed in England had limited, non-expandable character display capabilities, because emphasis was placed on immediate availability[45]. One of the greatest flaws in these systems was in assuming that viewers would rather watch poor text than much more attractive television broadcasts[17]. Consequently, systems developed soon after in France, Canada and Japan offered somewhat greater graphics capabilities.

### 3.3.1 Teletext

Teletext uses the standard vertical blanking interval (i.e. the five "blank" lines at the start of each frame) within normal television signal for transmission of data. The only special purpose equipment required for access to this information is a decoder and video generator.

One well-known example of teletext is closed captioning for the hearing impaired. The information contained within the vertical blanking interval is a textual representation of the material spoken during the broadcast. This information is overlayed onto the picture by a decoder.

Teletext is also used to present information not necessarily related to the current broadcast. The viewer uses a decoder to access available "frames" of information. The viewer first consults an index frame which provides codes for available information frames. When the viewer specifies a code, the decoder waits until the desired information appears within the vertical

interval. It then "grabs" the requested item and displays it. Both the decoder and the viewer must wait for the requested information to appear, because it is cycling through the broadcast. Typically, it takes on the order of ten seconds to cycle each fifty pages of material[45]. Consequently, to avoid lengthy delays which induce negative attitudes in users, teletext systems are characterized by relatively small amounts of material[2]. This amount can be significantly increased by devoting an entire cable television channel to teletext broadcast, resulting in "full screen" teletext.

The first teletext systems, Ceefax and ORACLE (Optional Reception of Announcements by Coded Line Electronics), appeared in England in 1976 and are still used to transmit frequently updated news, games and items of interest to consumers. However, due to restrictions in the number of characters which can legibly be displayed per screen in this viewing situation and hardware environment, and the previously mentioned restrictions on the actual number of screens, the combined textual material in these systems equals approximately four pages of standard newspaper text[45]. Because of this limitation, material tends to be broad in scope and often resembles mere headlines. Users are often encouraged to look elsewhere for greater detail[2].

Teletext systems offer little personalization in either content or in functionality. A viewer cannot select more than a single page at any one time. This necessarily implies that the user cannot arbitrarily wander through the available information. In a sense, teletext offers the same amount of interactivity and personalization as television—the channels can be chosen or switched off, and when a selection is made, the viewer receives exactly

the same information as anyone else[45].

Greater potential for teletext systems may reside in their ability to augment other systems. An interesting application involving "personal-casting"[6] employed computer interpretation of broadcast closed captioning to assemble television programming of specific interest to an individual.

### 3.3.2 Viewdata

Viewdata refers to two-way systems based on the telephone and an adapted television set equipped with a decoder. The information available to the system is stored within a central computer, and upon request is sent via phone lines to the viewer's television. Unlike teletext, viewdata allows a large number of pages, limited only by the central computer's storage capacity. Additionally, these pages are retrieved and transmitted at a very rapid rate. Response times are typically a fraction of a second[45], but necessarily fluctuate with the number of simultaneous users[2]. However, viewdata usually involves greater costs than teletext, which may prohibit its use. The viewer commonly must pay per frame accessed, as well as any incurred telephone charges.

Viewdata typically utilizes a menu-based tree structure for data organization and retrieval. Levels of indexes are presented to the viewer, and a tree is searched until the desired material is located. This method of interaction is easy to learn and requires little system overhead. However, it is geared towards task accomplishment, not entertainment or arbitrary

perusal; it is useful when the user has a clear idea in advance of the information desired. Furthermore, this structure tends to have a poor success rate. At a search depth of only four levels, one study showed that most subjects had to "back up" because they had made a mistake. Keyword-relational methods of interaction were found to be more successful and, over time, more popular[39].

The first viewdata system, Prestel, was previewed by the British Post Office in 1977, became operational in 1979, and by the beginning of 1984 had 317,000 available frames[2]. Information within the system is obtained from a variety of Information Providers (IPs) who are responsible for individual database and frame design. The material available includes news, games and specifics such as train times and restaurant listings. The supplying IP receives a portion of the revenue from each frame accessed. For this reason, the individual IP is usually unwilling to direct the viewer to information of potential relevance within other IP's databases. Consequently, the viewer may find complementary information unnecessarily difficult to locate[45].

Just as in traditional publications, advertising is an important and necessary part of viewdata. However, there are some essential differences. For example, exposure to advertisements within viewdata is an active rather than passive exercise. The viewer can request to be presented with information on specific products and services. Additionally, the distinction between information and advertisement is often vague in these systems. For instance, a frame presenting train times and costs is effectively both. Viewdata systems also allow advertisers to monitor access to specific ad-

vertisements and acquire demographic information on users. Consequently, specific groups can be targetted based on their interests[2].

## 3.4 Optical Discs

Videodiscs and the recently developed compact disc read only memory (CD-ROM) make exceptionally large storage available to localized electronic publishing. Videodiscs provide 54,000 single frames or 30 minutes of motion video[36], while a single 120mm diameter CD-ROM has a capacity of 600 megabytes, the equivalent of 200,000 pages of text[8]. The strength of these media lies in the ability to randomly access the large amounts data they hold.

Several electronic publication investigations undertaken at the Architecture Machine Group at M.I.T. utilize videodiscs. The Movie-Map allows interactive, surrogate travel through Aspen, Colorado[25]. The viewer decides which streets to "drive on", in what order, during which season, and at what speed and angle of view. The Movie-Manual[3,16] is an electronic "book" stored on videodisc, which incorporates video, sound and text to create a dynamic manual for repair and maintenance of automatic transmissions. The electronic newspaper project, NewsPeek, creates a personalized paper through the use of remote news databases, such as the aforementioned Nexis, and local videodisc libraries of relevant images[26].

These systems support highly personalized user interaction through the use of a touch sensitive display. The user is allowed to indicate a new "direction" to pursue at any time, with no need to wait for a list of options

made available at a predefined branch point[3]. However, this capability requires a great deal of advance planning of content and its placement on the videodisc or videodiscs. The Movie-Manual also allows the viewer to make annotations to sections of the manual. These annotations are played back for the specific individual upon subsequent viewing, thereby increasing the level of personalization.

CD-ROM is just emerging as a potential storage device for electronic publications. Among the first applications for this medium are an entire 20 volume encyclopedia on a single disc, and a monthly *disc-publication* of financial facts on 10,000 different corporations[8]. Unfortunately, CD-ROM currently possess a few drawbacks; namely, access is too slow for real-time applications, there are no industry standards for data formatting, and the ability to store video and audio is still in the development phase.

## 3.5 Electronic Mail, Computerized Conferences, and Electronic Bulletin Boards

Electronic mail, computerized conferences and electronic bulletin boards can all be classified as computer-based message systems. They are employed in both business and personal matters, and in recent years have experienced a great increase in use due to the popularity of the personal computer[2].

These systems possess a number of common characteristics which distinguish them from conventional communication media. Each allows information to be transmitted with the instantaneity of the telephone, but

does not require that the recipient be reached directly at a particular instant to insure delivery of the message[2]. Therefore, the user need not be concerned with common communication deterrents, such as time zone differences. Additionally, the user can send and examine correspondence at his or her convenience and individual pace. However, these systems are not flawless, and have often been criticized for their impersonality, rigidness, inability to address social needs, and lack of useful communication cues, such as non-verbal feedback[20,39].

Specifically, electronic mail systems are used to compose, edit, send, receive and store primarily person-to-person messages. They are commonly characterized by a simple command set which allows for easy composition and transmittance of correspondence[20]. Such systems are provided in many private companies to support internal communication and are also available through cross-company computer networks, linking users in geographically disparate locations. Home computer users can access mail systems through microcomputer networks such as The Source and CompuServe[39]. Electronic mail systems often prove invaluable in situations where rapid and reliable communication could not otherwise be conducted[50].

Computerized conferences, like traditional conferences, provide a means for individuals to discuss and debate a predefined subject. These systems allow both "public" and "private" messages to be exchanged within a common topic file. They often provide special software, tailored to support the needs of a particular group, and generally employ a moderator who invites participants and prepares the initial agenda[20].

Individual needs tend to be strongly supported by computerized conferences. Generally, these conferences extend over longer periods of time than traditional conferences, thereby allowing the individual greater control over timing and preparation of responses[39]. In addition, information regarding how far a member has progressed within a conference is often maintained. The computer can then position the individual at the beginning of "new" material when he or she next accesses the system[37].

Computerized conferences provide other benefits not afforded by their conventional counterparts. For example, they allow all members to have an equal share in the discussion, regardless of the actual number of conference participants; there is no equivalent to "speaking in turn" within these systems[39]. Additionally, conference members are given the option to submit input anonymously. Finally, such conferences allow the development and progression of an idea to be easily traced. Each individual has access to the series of documents received and can re-examine them at will[20].

In a sense, bulletin boards are a less structured form of computerized conferencing. They can be private, providing access to a limited number of users, or public, enabling large groups to share information. Bulletin boards are used to post, file, and retrieve messages primarily sent from an individual to an entire group, where the targetted group has a central focus or theme. For example, bulletin boards exist which only address political issues, while others are oriented towards specific computer user groups[50]. Individual bulletin boards commonly offer greater specialization within their overall theme. For example, within a bulletin board offering

public domain software, a user can request only those programs written in the Pascal programming language for 8-bit computer systems[9].

## 3.6 Electronic Journals

Electronic journals are essentially another form of electronic message systems. However, they are distinct by virtue of their intent, the lengthy communications supported, and the types of interactions they facilitate-vallee84.

In scientific communities, new developments are often slowly communicated due to the necessary channels which papers must traverse. Each paper must be created, edited, refereed and then distributed. Often times, this slowness seriously limits progress in rapidly changing disciplines. The electronic journal is often viewed as a means for accelerating and reducing the cost of this lengthy scholarly publication process.

The first electronic journal project was undertaken at the New Jersey Institute of Technology. In 1978, a refereed papers journal was incorporated into the broader computer conferencing experiment know as the Electronic Information Exchange System (EIES)[20]. Although the study was inconclusive[17], it did provide some useful insights. One of the system's main goals was ease of use, and to this end, users were offered simple as well as advanced command sets, and the ability to create personal commands. However, users indicated that the command language was too complex, and commands too numerous to easily learn and master[31]. Use was also impeded by long system response delays, attributed to the large number

of projects and users involved in EIES. Additionally, the journal's lack of status and prestige probably gave it low priority for potential authors[44].

The Birmingham and Loughborough Network Development (BLEND), financed by the British Library, was a three year electronic journal project initiated in January 1981[17]. Papers were submitted and refereed through the system, and posted in an archive file if formally accepted[50]. The system allowed the user access to several different text editors, as well as an optical character recognition system for input of already typed manuscripts. Even though the system had several problems, including very slow BAUD rates and bureaucratic hassles, 20 papers were submitted within the first two years[44]. As with EIES, the BLEND results were largely inconclusive[18]. It was found that lack of system simplicity prevented greater use. Professors basically were not willing to devote any extra time to mastering the system, and felt it should be as easily accessible as the telephone[44]. As with EIES, the BLEND project was largely inconclusive.

Neither of these electronic journal experiments applied the computer control afforded them to effectively create powerful alternatives to the standard journal. Essentially, both systems mimiced the conventional journal production process, and employed the computer only in the limited role of "time-saver." Electronic journals can, however, provide important advantages over traditional journals. For example, it has been suggested that these journals include "citation trails," whereby older works are utilized to give background on later work which they effectively supported[43].

# Chapter 4

# The Electronic Special Interest Magazine

This chapter contains a description of the features and functionality of the electronic special interest magazine (EMAG) developed. The investigation is based on *Popular Photography* and throughout the following description, references to this magazine are made for illustrative purposes. The implementation, however, is in no way restricted to this magazine, and could be widely applied, as is often noted.

## 4.1 The Hardware Environment

The EMAG runs on a 68000 based Sun Microsystems computer. The display is generated on an RGB frame buffer with resolution 768 by 512 and 8 bits of color. An encoder is used to convert the frame buffer's output into NTSC, and the magazine is finally displayed on a standard television monitor equipped with a transparent touch sensitive screen.

The system could be easily reconfigured to include a CD-ROM reader or videodisc player, if either is required for data storage.

## 4.2 Proposed Method For Publication

The design and development of the EMAG was based on a hypothetical model for its publication. The implementation assumes that upon subscription, the user receives a set of software which contains issue-independent information. This software contains knowledge of the EMAG viewing environment, the procedure for establishing the user profile, the rules necessary to put an issue together and the magazine's specific stylistic requirements, such as which fonts are used for titles in the table of contents and which are used for captions.

The content for each EMAG edition is separately transmitted by the editorial staff to the subscriber as a "data set." This material might be sent via phone line, floppy disk, CD-ROM, or digitally encoded videodisc. Once received, this data is manipulated by the programs described above to create and present the individualized issue.

It is also assumed that each data set received by the subscriber contains the contents of all previous issues for the current year, the last five years, or some time frame determined, presumably, by limitations in data storage. The amount of this material actually selected and presented to the viewer in the assembled personal edition is dependent on several factors. These factors might include the user's past viewing record and personal profile, and ostensibly, the duration of the particular subscription.

In the same way that popular magazine's frequently update their format, the electronic magazine subscription would, of course, allow for software supplements and updates.

Obviously, this proposed method of publication does not accommodate the occasional magazine reader. The design of the EMAG was never intended to support such use. It is generally anticipated that in the future publisher's will have to maintain both electronic and non-electronic forms of publications[24].

## 4.3 Contents

At the most generalized level, the EMAG is composed of the traditional magazine elements. It is divided into three basic sections; namely, the table of contents, the features section, and the departments section. For the most part, the elements present within each of these sections closely approximate the content found in their conventional print counterparts. However, each section additionally includes non-standard material, as will be described.

In general, the features section contains articles which deal with a specific topic in substantial depth, both textually and pictorially. Such articles are usually the main focus of any magazine issue.

Each individual department within the departments section consists of articles that appear regularly and address a specific subject, or present a single writer's views. For example, *Popular Photography* includes departments devoted to color darkroom technique, photographic workshops and

the Editor-in-Chief's comments. Departments are also commonly referred to as "columns."

The one standard component not found in the EMAG is a cover. In conventional magazines, the cover is used to attract buyers at the magazine stand, to compete with other media in the home environment, and, to a certain extent, to advertise its contents[30]. None of these reasons necessitate its inclusion.

The following sections consider unique aspects of the EMAG's content. Details of the material contained in the table of contents are presented in Figures 4.1 and 4.6. Similarly, descriptions of the contents of typical feature and department pages are supplied in Figures 4.4.2 and 4.4.2, respectively. Specifics concerning the actual visual presentation of this material are discussed in Section 4.4.

### 4.3.1 The old and the new

The EMAG distinguishes itself from standard magazines in that each edition contains previously "published" material. This is important and useful for several reasons.

One of these reasons is the basis for *Reader's Digest*. The magazine's founder Dewitt Wallace was convinced

> *... that many people liked to clip interesting articles, stories and anecdotes from various magazines and re-read them from time to time[19].*

The overwhelming success[30] of the *Reader's Digest* attests to this claim. As mentioned earlier, it has been shown that a very large percentage of special interest magazine readers do keep issues for future reference. However, specific material of interest is often difficult to locate. The EMAG allows for easy access to such material.

Maintaining previously published material is also important because it establishes a strong dialogue from issue to issue. When a Letter to the Editor addresses a specific article which first appeared at an earlier date, the EMAG presents that letter alongside the indicated article in later issues. Similarly, an article published in parts over several issues is eventually presented as one cohesive work. In this way, a viewer can make comparisons and connections not easily made in a conventional magazine. The EMAG effectively amplifies a major role of the conventional magazine: to provide a forum for ideas and debate over time[10].

This inclusion of earlier material also frees the user from the feeling that an issue is a complete unit and should be examined as such. The viewer can leave articles of interest unread without fear that they will be lost or forgotten; they may actually be more "complete" in the future. Additionally, since much magazine content tends to have long-lasting value, a viewer with newly-cultivated and constantly changing interests can easily find relevant articles amongst previously published material.

### 4.3.2 The unique nature of the EMAG advertisement

Advertising is an integral part of both feature and department pages in the EMAG. This emphasis is based on the finding that, in special interest magazines, readership of ads often surpasses that of editorial content [29]. The EMAG extends this notion, and provides the viewer with substantive and comprehensive advertisements.

Most special interest magazines are commonly filled with advertisements for products and services in which the reader is interested, because they are directly related to the specific focus of the magazine. Within the EMAG, the advertisements are of potentially even greater interest to the viewer, because they are selected and presented based on *each individual's* more specific concerns within the boundaries of the magazine's concentration. The specific method employed in the selection process is addressed in Section 4.6 on personalization.

Because the content of the ad is assumed in advance to be appealing to the viewer, attention-getting and flashy advertising is essentially unnecessary. This is quite different from standard advertising which typically emphasizes form and presentation environment and seldom stresses actual product information [52]. In contrast, the contents of EMAG advertisements are predominantly informational (see Figure 4.4). The typical advertisement is fundamentally composed of a review and/or in-depth description of the product or service. This type of approach has been employed before within a different style of publication. The Whole Earth Catalogues consist completely of evaluations of items, which are not referred to as advertise-

ments, but alternatively as "access" devices[7]. This formulation served as motivation for the structure of the EMAG advertisement.

As will be discussed later, EMAG advertisements have no size limitation, which further facilitates their ability to provide sufficient information to the satisfaction of even the most interested viewer.

## 4.4 Design Elements

> *Good typography and design are, despite all appearances to the contrary, eminently possible with modern technology[47].*

This section describes the rationale behind the specific design characteristics of the EMAG . Careful design and organization are necessary to assure its readability and ultimate value as a publication. Due to the important entertainment function the magazine must fulfill, a stylized and attractive appearance is essential.

### 4.4.1 General characteristics of the design

A number of design elements are common to each of the magazine's sections and will therefore be discussed prior to a description of specific section characteristics.

#### Screen organization

Each screen of the EMAG is divided into two sections. This is due in part to avoid disorientation of the reader. Magazines and books are usually

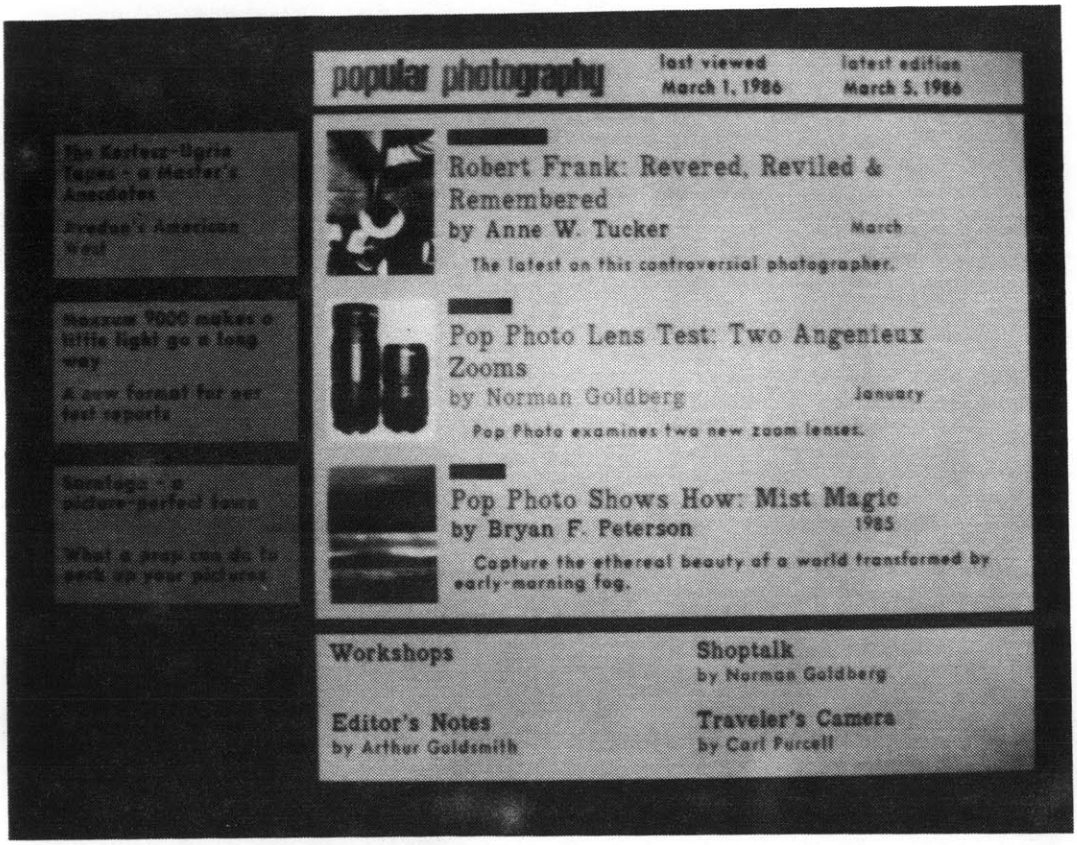


Figure 4.1: The table of contents is divided into several discrete sections as shown. At the top of the magazine section (the larger section to the right) general EMAG information is displayed. This includes the magazine's name, the date on which it was last examined by the current viewer, and the date associated with the issue currently under scrutiny. This latter date reflects the time at which material was most recently received. Beneath this section, a large area is devoted to information concerning features contained within the edition (see Figure 4.6 for a more detailed description of a single feature entry.) The smaller section at the bottom contains a titles and, when applicable, authors' names for currently available departments. Non-conventional information can be found in the supplementary section (the leftmost area). This information includes listings of *correlated articles*, or articles related in subject matter to the specific features depicted at right. For example, the article about Richard Avedon is correlated to the first feature about the photographer Robert Frank. Upon request, specific titles of entries within departments are also supplied in this section.

vertically oriented, whereas television screens are not. The EMAG utilizes the horizontal television screen, but divides it into two distinct locations. The rightmost section is of standard magazine proportions and contains more conventional magazine material. The area to the left is used for additional information, unique to the EMAG. These areas will be referred to as the *magazine section* and *supplementary section*, respectively and can be seen in Figure 4.1. The magazine section is demarcated by a very light gray background, while information in the supplementary section is produced on a darker gray background to emphasize the distinction between these two regions.

### The use of color

Colored type is used to impart information to the viewer throughout the magazine. It has been shown in both computer display design[34,38,40] and magazine design[4,12] that color can be very successfully employed to this end. However, it is most effective when used sparingly and when colors are carefully chosen to allow for ease of readability. To accommodate this, the colors chosen are not highly saturated or spectrally extreme[34].

Specifically, feature titles are presented in light green. They are easily distinguished from department titles, which are characterized by dark green type. In the magazine section, red is attached to the names of some authors to stress that they have written more than one viewable article. Red is used in the supplementary section to indicate that the specified item is currently being viewed in the magazine section. Advertisements incorpo-

rate the colors orange and brown to distinguish them from the text of the main article.

### The presentation of text

Quality of type on a standard television is an important concern for electronic publications such as the EMAG. Limitations in the number of legible characters displayable at one time, and the availability, in some cases, of only upper case letters has proven detrimental to electronic publications in the past[40,35]. Yet, it seems illogical to base systems such as the EMAG on specialized equipment when the television already holds a predominant place in the average home.

One solution to this problem is the use of soft, or grayscale fonts[42], where each character is composed of more than one bit of color information. This method allows for the construction of legible text-intensive screen displays. It also allows for the construction of font sets which resemble styles found in standard print media.

The fonts used in EMAG do not reflect those used by *Popular Photography*, but are taken from two-bit soft font sets developed at the Media Laboratory. They sufficiently illustrate the benefits of using high quality and varied fonts. The hypothetical publication scheme previously described allows for the inclusion of bit maps of a magazine's distinctive fonts within the software set. Therefore, the EMAG does not force any sacrifice of typographic style.

In standard magazine design, the use of different fonts styles ("structural" contrast) and sizes is often employed to create distinctions between,

for example, a title and the actual text of an article. This promotes quick and easy reading[12,33]. The EMAG utilizes fonts in the same way to achieve these desirable results. Titles are presented in a large font. Author's names are presented in the same style font, but are of smaller size and are in boldface. Large sections of text are produced in a considerably smaller and contrasting font.

As recommended for screen displays[40], large textual sections are produced without right hand justification. Text is also presented in a single column, unless the width of this column would exceed 60 characters and spaces. This has been determined to be the optimum line length for standard printed materials[46], and is assumed to be equally valid for text displayed on a screen.

To maintain viewer orientation within an article, a graphical marker is used to indicate when the end of a text passage is reached.

### The presentation of photographs

All photographs used in the EMAG were digitized to 8 bits of grayscale from the actual pages of *Popular Photography* or from slides. Each image was contrast corrected, reduced to 4 bits of grayscale information(to allow for the use of non-grayscale color as mentioned above) and stored in several sizes. Regardless of the stored size, the proportions of each photograph were always preserved. Although far from the resolution of standard magazine photographs, the photographs in the EMAG continue to solicit a notable number of positive comments concerning their quality.

Currently, color photographs are not included in the EMAG, but there is no substantive reason for their exclusion.

### 4.4.2 Design specifics

Details of the designs employed in the table of contents, as well as the feature and department pages, are now considered.

#### The table of contents

The design of the EMAG table of contents (see Figure 4.1) closely resembles that of conventional magazines[30]. A few specifics of the design are notable.

The magazine's name is produced in its logo typeface for easy identification.

Unlike conventional magazines, the EMAG provides an indication of article size. The relative length of each feature article is expressed by a graphical bar at the top of each such entry, as shown in Figure 4.6. This bar is composed of two shades of gray which indicate the proportional amount of text and illustrations present in the article, respectively.

In an earlier version of the EMAG, color coding of titles was used to impart information regarding the date an article was received, but this proved distracting and detrimental to the overall display. As indicated earlier, a generalized date is currently presented for each feature. This has proved much more informative.

Only three feature entries and four department entries are shown at any

one time in the table of contents. This allows for the visually desirable[4] uncluttered presentation of a sizeable amount of informative material concerning each feature.

### Feature and department page layout

In the following discussion, the terms "page" and "screen" are interchangeable.

The EMAG currently allows several different layouts for feature and department pages and can easily accept more. In general, it is assumed each page will include text and a illustration. The layout is then selected based on the horizontal or vertical orientation of the illustration. As the end of an article is reached, often only text or only illustrations remain. Special layouts handle this situation.

The program designs a page by first fitting the illustration into the selected layout. Text associated with the article, relevant ads and related material is then formatted around it. In this way, a photograph is never distorted, and pages based on the same layout structure have a distinct appearance.

An article will usually fill several consecutive screenfuls. The layout of each is determined in a similar same manner.

As indicated above, the presentation of an EMAG article mimics the linear presentation of an article in a standard magazine. However, the display of ads and related material within an EMAG article follows a unique structure made possible by computer control. In any one layout, this type of material is allocated a small amount of space—just large enough to indicate

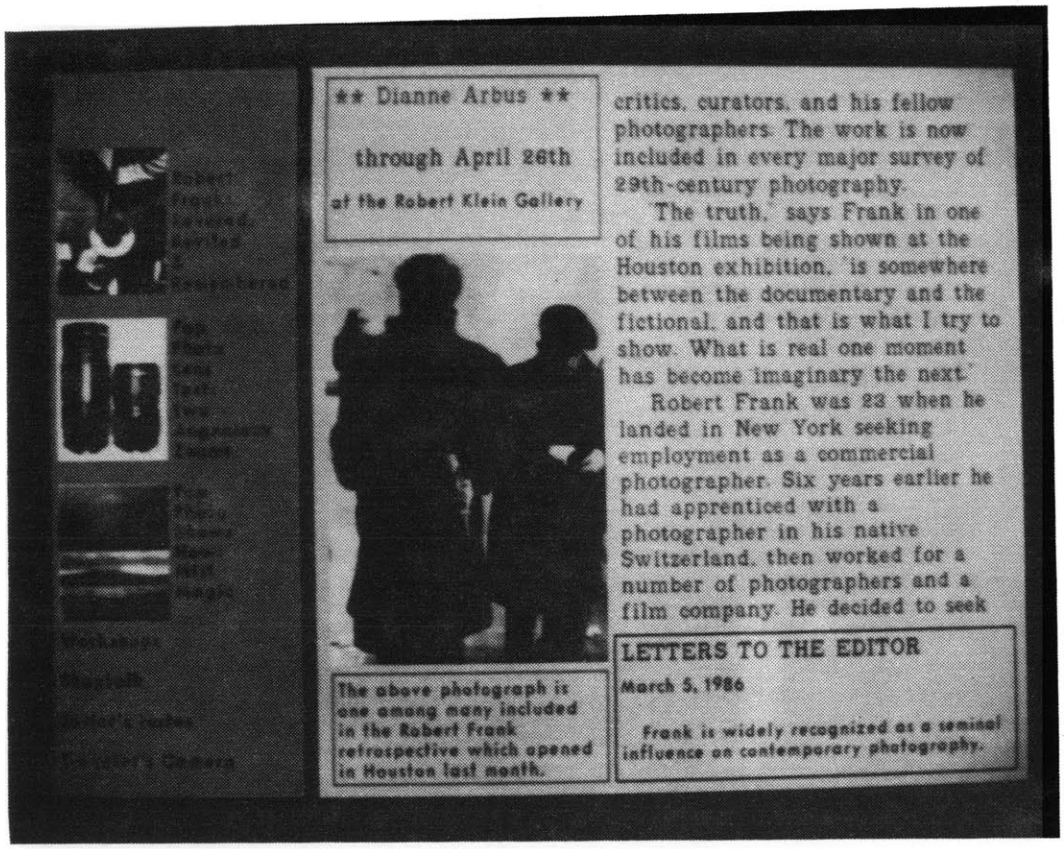


Figure 4.2: A page from the feature on Robert Frank is shown above. As in most feature pages, the continuing main text of the article and a photograph are presented. At the upper left, an advertisement for the Diane Arbus show at a local gallery is included. A Letter to the Editor received in response to this feature is presented at lower right. The simultaneous presence of this letter and the feature it addresses is made possible through the EMAG's "continuous publication" facility. The general layout of this feature page was selected based on the horizontal orientation of the illustration. The proportions of the illustration were then used to define the areas allocated to textual material.

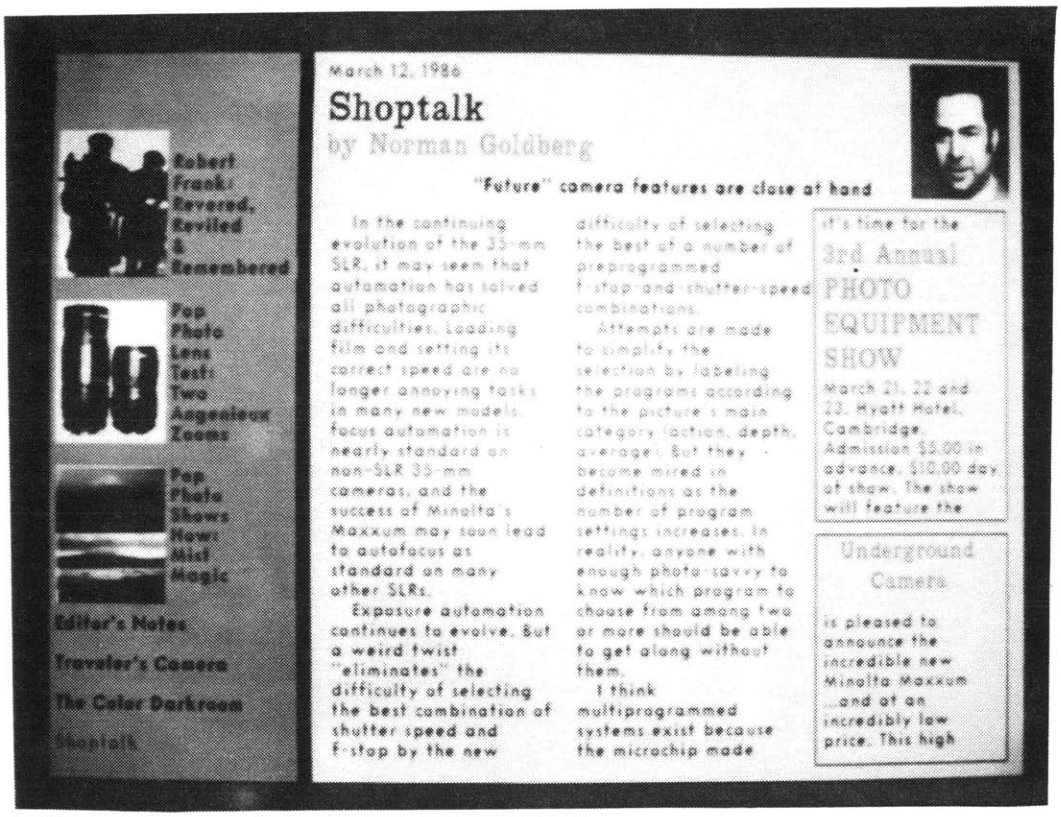


Figure 4.3: A typical page from the EMAG department "Shoptalk" is shown above. It contains the text of the article, a photograph of the author, and advertisements for an equipment show in the viewer's area and a camera being sold at a local photo store. The supplementary section contains an abbreviated table of contents.

it's focus, as shown in Figures 4.4.2 and 4.4.2. The full contents of an ad or related article is shown in a "pop-up" window which is disclosed upon request (see figure 4.4). These windows are scrollable, and consequently can contain a virtually unlimited amount of material. New ads and related material with similar "depth" are displayed on each page. This design allows for the inclusion of many ads, each possessing substantially greater detail than found in conventional magazines. Both reader and advertiser can benefit from this design.

## 4.5 Functionality and Interaction

The EMAG is designed to include both the functionality of a conventional magazine, as well as unique computer-supported capabilities. Consequently, the EMAG supports most styles of conventional magazine reading. The viewer can choose to sequentially look through every page of an issue, "flip" through just the illustrations, or read the first line or paragraph of every feature.

However, the EMAG also promotes "connectivity", a quality viewed as essential to good electronic publications[56]. Connectivity refers to computer-specified links between various elements. In a sense, the EMAG is a database, and several worthwhile classifications can be specified. For example, it's possible to find every article within an edition written by a certain author, or of a certain type. The latter is possible because special interest magazines invariably present articles which can be easily classified.

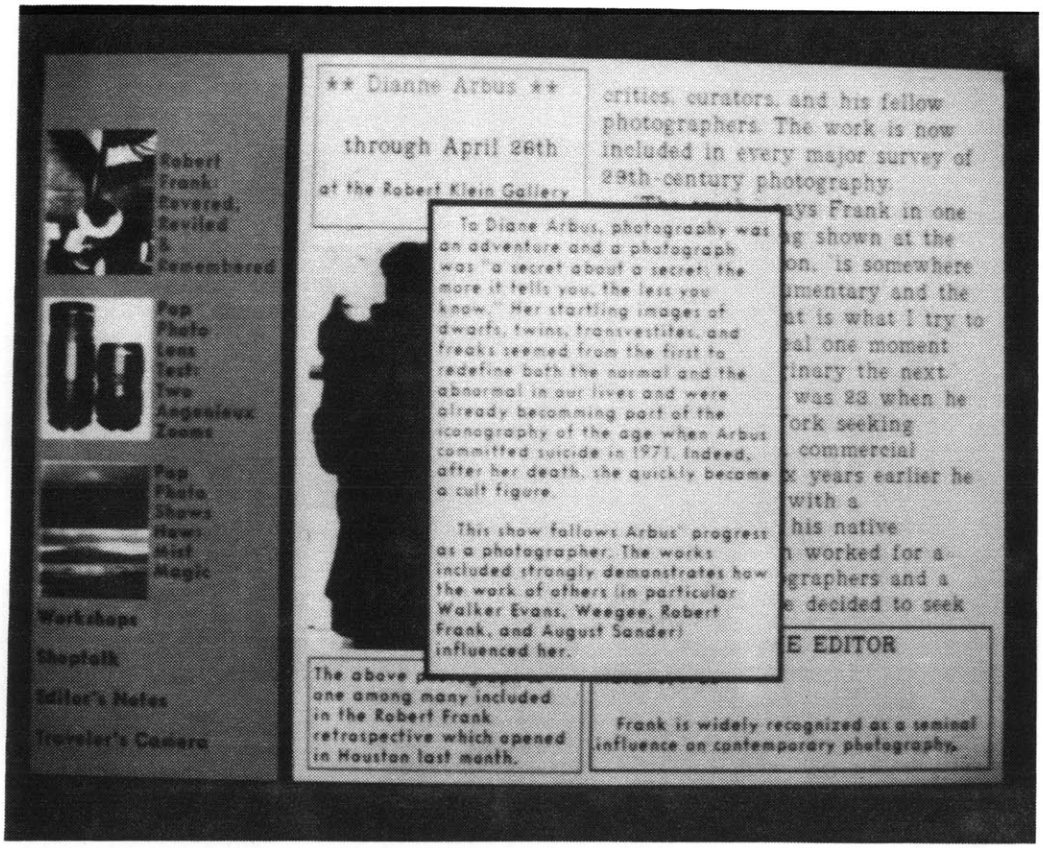


Figure 4.4: Upon viewer request, an ad or related article is expanded to fill a "pop-up" window, which can be scrolled to reveal more material. As shown here, the viewer has requested to see the full advertisement for the Diane Arbus gallery show. This method of presentation allows many ads and related articles to be shown on each page in brief. The viewer decides which material should be explored in-depth.

For example, the articles which appear in *Popular Photography* almost always fall into one of the following categories:

- equipment review
- technical discussion (darkroom technique, etc.)
- famous photographer profile
- tips for taking better photos

In this discussion, articles which are related by type in this way are referred to as *correlated articles*.

### 4.5.1 The touch sensitive display

A touch sensitive display (TSD) is employed for viewer interaction with the magazine. It determines the location and type of gesture made by the viewer's finger on its surface. The TSD is an attractive device for several reasons; it is natural, intuitive and non-distracting[15].

#### Specific use of the TSD

The TSD is capable of sensing various types of gestures, including single point contacts, lines and circles. In an early implementation of the EMAG, many capabilities were controlled by graphical buttons which were activated when touched. In the current implementation, these buttons have been completely eliminated. This has proven beneficial, as it frees screen space for more interesting material and forces the functionality to be more

closely related to the actual content. Within this current implementation, various types of gestures have distinctive meanings. When they are applied to specific locations, the desired function results. In some cases, a type of gesture applied to a specific location has no valid meaning. When this occurs, a blinking message within the supplementary section provides feedback. However, such combinations should not commonly occur, as they represent illogical requests.

The valid gestures are defined as follows:

1. Touching any item indicates that the associated article should be displayed in full. For example, touching a title results in the display of the initial page of the specified article. This function completely alleviates the need for page numbers.

2. A horizontal linear motion across an item indicates that the user desires more information. For example, such a motion across a department heading produces a list of the titles available under the indicated department.

3. A vertical line through a rectangular area indicates a change in the contents of the specified location is desired. If the motion is downward, the contents is advanced to the next "screenful." Similarly, if the motion is upward, a "backwards scroll" of content occurs. For example, a downward motion within the main text of a feature article indicates that the next page is desired. In the event that a requested scroll cannot occur because of lack of material, a blinking message is displayed. This situation should not arise; as previously mentioned,

a graphical bar indicates all material has been presented and the end has been reached.

4. A circle around an item indicates that the item is not of interest and should be designated as such in later issues.

### 4.5.2 Options from the table of contents

The viewer is always presented with the table of contents upon "opening" the EMAG. This page may be examined for a lengthy period of time, and the photographs within it dynamically change to generate increased interest.

The viewer has potentially the most options for interaction within the table of contents. Feature or department listing areas can be scrolled up or down to reveal more material. Likewise, the areas within the supplementary section that contain correlated articles can be scrolled. The user can immediately turn to any feature, or the first entry in any department, or any related article by touching the associated title. The user can obtain a list of available entries within a department by employing a horizontal gesture at the location of the desired department's name. Furthermore, if color coding indicates the presence of such information, an author's name may be selected to receive a scrollable list of his/her contributions to the current edition (see Figure 4.5). If none of the articles listed within this window are selected for viewing, the window is removed and the normal table of contents display reinstates. An article can be marked as of little interest by circling any part of its listing.

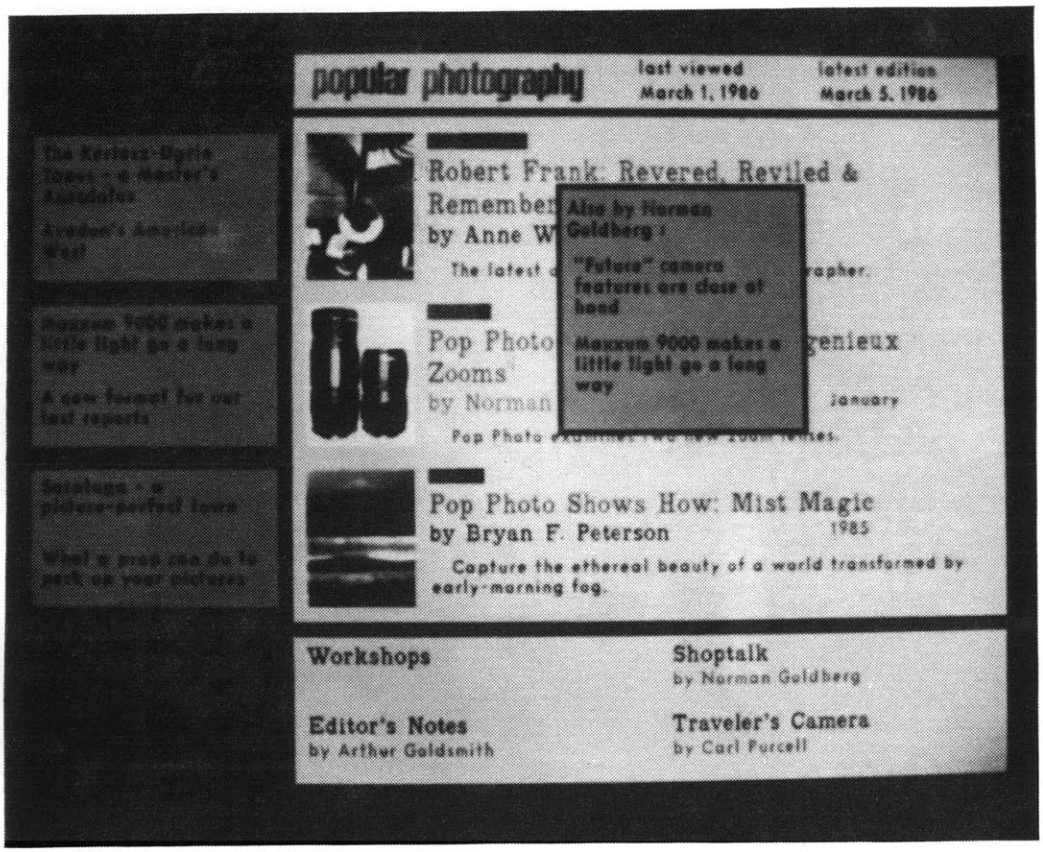


Figure 4.5: As shown above, a listing of other articles written by Norman Goldberg has been disclosed within a "pop-up" window. The viewer can select to view any of these items by touching the corresponding title. Similar lists can be obtained for any author who has contributed more than one item, and whose name, therefore, appears in red.

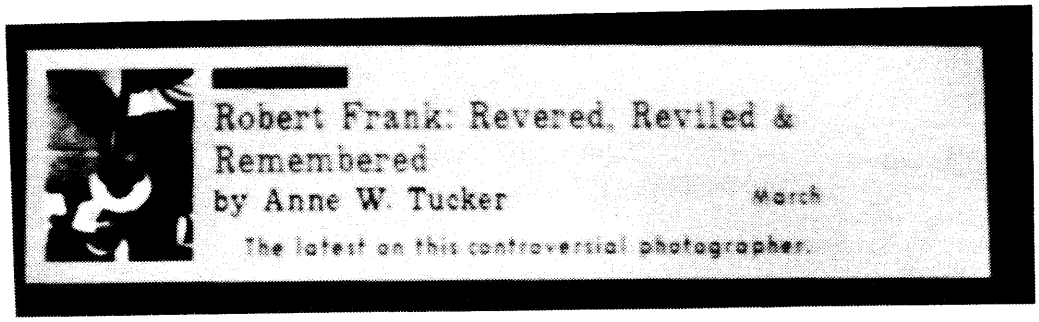


Figure 4.6: As shown above, a typical feature entry includes an illustration from the article, the title, the author and a brief opening lead. In addition, several non-standard elements are included. The bar at the top of the entry indicates relative length of the article. Additionally, the change in color within this bar indicates the proportional amount of text and illustrations, respectively, available for this feature. A generalized date (i.e. the month if the article was written during the current year, the year if it wasn't) is also supplied.

### Examining the feature entry

The table of contents allows for thorough inspection of any feature article. The viewer can "flip" through small versions of all photographs in an article, and each feature entry can be scrolled to reveal a longer introductory lead, followed by the entire text of the article (see Figure 4.7). In this way, the EMAG takes advantage of electronic flexibility to facilitate the needs and preferences of different readers.

## 4.5.3 Options from a typical page

From any feature or department page, the viewer can move forward or backward within the displayed article. When the end of the article is reached, as would be expected, the first page of the next article in sequence is shown.

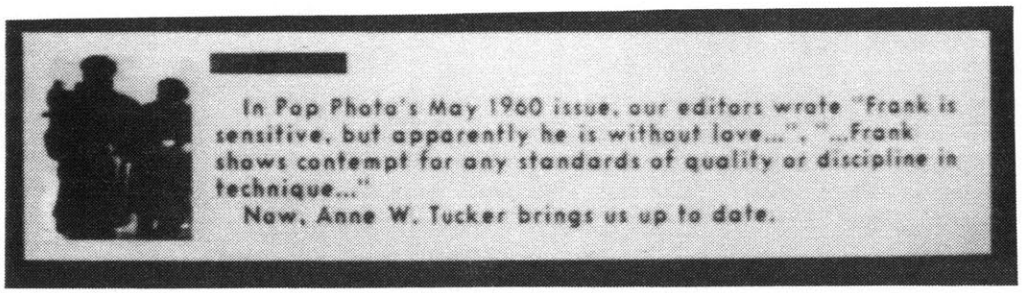


Figure 4.7: The viewer has requested that an expanded lead be shown for the article on Robert Frank. If the viewer were to request further scrolling of this area, the actual text of the feature would be presented. Additionally, the viewer has requested that another illustration from the article be shown. The viewer can examine all of the illustrations for an article, in miniature, within the table of contents.

However, contrary to what is found in conventional magazines, when the user moves backwards from the first page of an article, the EMAG displays the *first* page of the previous article. It is assumed that this location is more desirable to the user than the "absolute" previous page.

As previously mentioned, each ad and related article is allocated a small amount of space on feature and department pages (see Figures 4.4.2 and 4.4.2). To obtain the "full" ad or article, the user need only indicate that more information is desired by a downward "scroll-forward" motion. A pop-up scrollable window is then presented, as shown in Figure 4.4, and remains on the screen until some command outside of its bounds is requested. This window can be scrolled backwards and forwards to view the entire contents of the item. However, since ads and related articles are distinct entities existing only on a specific page, scrolling beyond their contents is not possible, and an error message is displayed if such a request is made.

In other words, these articles only exist in the "depth" dimension—they do not have sequentiality in the linear direction.

Since the typical page contains an abbreviated table of contents within the supplementary section, the viewer can execute an obvious subset of the functions available in the full table of contents. The user can also choose to return to the actual table of contents for full functionality.

It should be noted that if the viewer were to simply start within the first feature and scroll forward until the end of the magazine was reached, he or she would examine all of the features available, followed by all of the entries in the first department, then those in the second department, and so on, until the last page of the last entry in the last department was reached.

## 4.6 Personalization

Perhaps the most distinguishing aspect of the EMAG is its ability to customize the content it contains for each subscriber. As noted earlier, the magazine editors supply the EMAG compilation software with a complete set of all possible material for an edition. A personally relevant subset of this material is carefully selected and presented for each individual subscriber. The methods by which this tailorization occurs are now considered.

### 4.6.1 The user profile

Each user of the EMAG is given the option to establish a profile of personal characteristics. For example, in the current implementation, the user can indicate his or her place of residence (i.e. city and state), the locations

he or she would consider traveling to, and the types and brand names of photographic equipment he or she owns, or is interested in owning.

This information is then used to customize the material selected and presented. For example, the listings within the photographic workshops department all take place in locations near the viewer's residence, or in areas the particular subscriber might travel to (see figure 4.8); advertisements which are included are oriented towards products of specific interest; the article on a new flash unit does not offer a *list* of compatible cameras, but indicates whether the unit can be used with the viewer's *specific* model of camera.

Personal profiles can be similarly employed to customize any special interest electronic magazine. Consider, for example:

- A gourmet magazine which knows what foods you like and dislike, what foods are seasonally available in your area, and what cooking accessories you wish to purchase.

- A "shelter" or homeowner's magazine which can make home improvement suggestions based on your floor plan, and can tell you when to plant which flowers in the garden based on your local climate.

- A train collectors magazine which informs you of the next auction in your city, and advertises tracks for your particular train size, that are priced within your range.

Profile-based personalization affords the EMAG unique opportunities. It can simultaneously provide material of widespread interest and local mer-

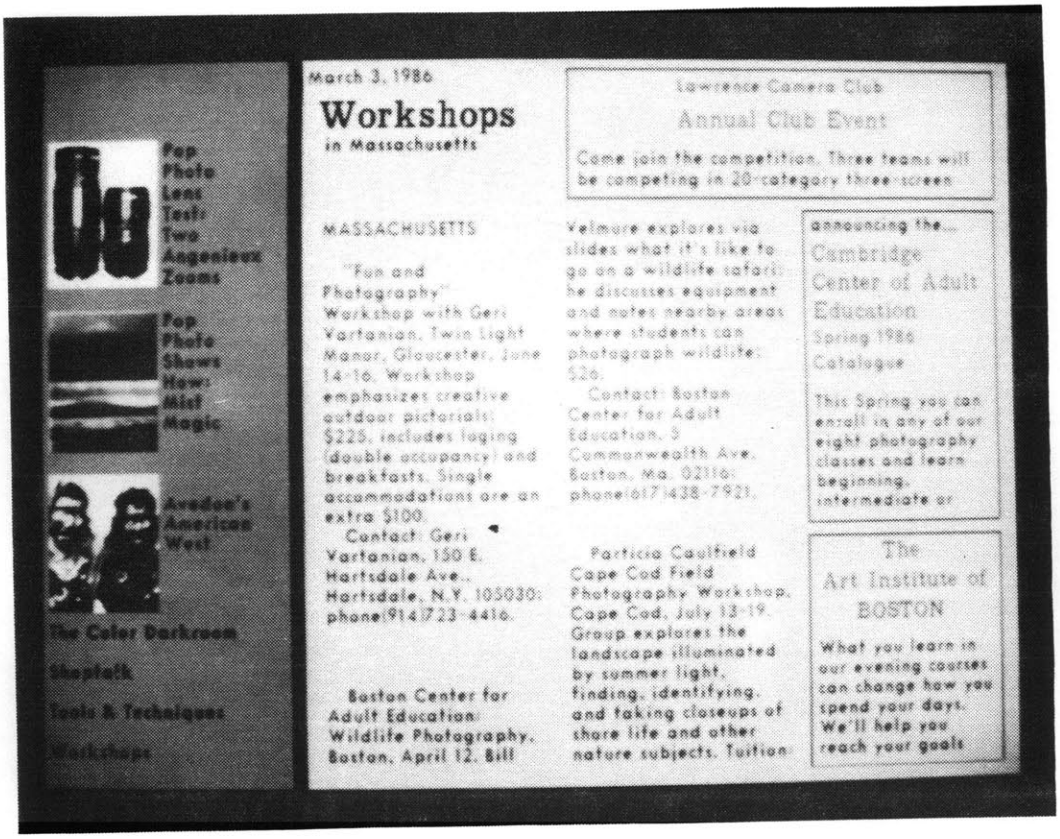


Figure 4.8: The viewer profile is used to select appropriate content for articles and advertisements included in each individualized EMAG edition. In the EMAG page shown above, the Workshops department contains only listings for the state of Massachusetts. This reflects the specific viewer's place of residence. The advertisements shown also contain information regarding courses available in this location.

chants' advertisements. It effectively maintains a national scope, without abandoning the specific interests of the individual. However, it does require that multiple versions of articles, or at least sections of articles, are written and supplied.

Of course, individuals constantly acquire new interests, some of which are created by the viewing of unanticipated advertisements or articles in magazines. To this end, an EMAG viewer profile can always be updated, or even eliminated.

### 4.6.2 The user history

The first time a viewer "opens" the EMAG, a history, or log, of actions is established within the individual's home directory within a file named ".maglog." This log is constantly updated, and its contents directly effect the presentation of the EMAG on subsequent occasions. Since a separate log is maintained for each viewer, any single EMAG edition can be organized and presented in a number of ways dependent on the previous actions of the specific individual.

Several items are maintained in the log. These include the date of each viewing session, a list of the articles viewed, and a list of articles indicated to be of no current interest.

#### How the user history effects presentation

Because the table of contents can display a limited number of entries on the screen at once, and because the user is first greeted with this table

of contents and accesses the first article through it, the order in which it lists items is very important. The viewer history is used as a basis for determining this order in the hopes that material of greatest interest to the individual will always be presented first.

Articles are given priority according to the following criteria:

1. New items.
2. Items which have been viewed before, but contain some new material (such as a Letter to the Editor).
3. Items which have not been viewed before and which contain some new material.
4. Items which have not been viewed before.
5. Items which have been viewed before.
6. Items which have been indicated to be of no current interest.

When more than one item falls into one of the above categories, ordering is based on the date the material was received. The most recent material is given highest priority. This hierarchy is widely applied to feature and department articles, as is discussed in Section 4.7.2.

It should be noted that no article is completely eliminated from the contents of the EMAG. Items indicated to be of no interest at one time are maintained "at the end" of each edition to permit the user changes of heart.

## 4.7 Edition Creation Rules

As previously mentioned, the material available for an edition is assembled and presented based on a set of rules. The rules employed in this production are now considered.

### 4.7.1 Data formats

The EMAG assembling program expects that material for the edition will be made available in specific formats and in specific locations. The details of this specification are now considered.

#### Feature articles

All material for all features is stored within a directory defined in the magazine header file (*mag.h*), and referred to as FEATDIR. The bulk of each individual feature's material is stored in a distinct subdirectory of FEATDIR.

Each feature's existence must be explicitly indicated in the following manner. Two items of information concerning each available feature must be included within a distinct file, defined in *mag.h* and referred to as FEATUREHOME. Specifically, each line of FEATUREHOME contains the name of the subdirectory that holds the feature's material, followed by a number which indicates the *category* of that feature (see Section 4.5 for an explanation of category).

The following files containing material associated with the feature must be included within the subdirectory indicated for the specific feature. The

actual filename to be used is indicated in bold, and is followed by a description of its expected contents.

**TITLE** The full title of the feature.

**AUTHOR** The full name of the author of the feature.

**PICS** This file contains, one entry per line, the names of the files where illustrations for the article can be found, followed by the position (left, top, right, bottom) for the particular illustration within the specified file.

**various caption files** For each illustration indicated in the file **PICS** a caption should be supplied. The program looks for each caption in a file named [picname]_c within the feature directory, where picname is the prefix of the associated illustration file.

**SHORTLEAD** A one line lead for the feature.

**LEAD** The expanded lead for the feature, followed by the entire text of the feature.

**STORY** The full feature story.

**RELATED** This file contains information regarding specific advertisements and related articles to be shown with the feature. Each ad or related article is specified in this file on a separate line. The specification consists of the full path name of two files: the "title" file, and a file containing a short version of the item. This short version

is what is initially shown in the small area allocated to such items on the standard feature or department page. The in-depth version of the item is assumed to reside in a file of the same name appended with the suffix "LONG." Since the full path name of these files is provided, they need not necessarily reside in the unique subdirectory associated with the particular feature

### Department articles

All material for all departments is stored within a directory defined in *mag.h* and referred to as DEPTDIR. Just as in the case of features, material associated with a specific department resides in a subdirectory of DEPTDIR. Also, the existence of each available department for an edition must be indicated within a specific file defined in *mag.h* and referred to as DEPTHOME. The individual department listing within DEPTHOME consists solely of the name of the subdirectory of DEPTDIR where the department's contents can be found.

There are certain files which the EMAG assembling program looks for in each department's subdirectory. These files are now described. As above, the actual filename is indicated in bold, and is followed by a description of its contents.

**TITLE** The title of the department.

**AUTHOR** If an author exists, his or her full name is specified within this file.

**PICTURE** If an illustration is associated with the department, this file includes the name of the file where it is located, followed by its position within that file (left, top, right, bottom).

**ENTRIES** This file contains a list of the available entries for the specific department. Each line of the file contains two items: the name of the file within the department's subdirectory that holds the entire article, and a number which indicates the *category* of the particular entry.

**various entry files** As mentioned above, the actual text of each department entry must be contained within the file indicated for it in the **ENTRIES** file.

**various lead files** For each department entry indicated in the **ENTRIES** file, a one line lead is supplied. This lead exists in a file bearing the same name as the actual full text entry file with the suffix "LEAD" appended to it.

**various related files** For each entry indicated in the ENTRIES file, a file containing information regarding specific ads and related articles is supplied. Each of these files bears the same name as the corresponding full text entry file with the suffix "REL" appended. As in the case of features, each ad or related article is specified within the file by the full path name of its "title" followed by the full path name of the file containing the "short" version of the item.

### Additional advertisements

Once the files that indicate specific advertisements and related articles for presentation with a feature or department are exhausted, advertisements for the remaining pages are acquired in a different manner. A directory defined in *mag.h* and referred to as ADDIR must be consulted.

ADDIR consists of a number of subdirectories which are named using key words that reflect their contents. For example, advertisements for flash units are found under the subdirectory of ADDIR named "flash." Advertisements can be further classified through the specification of additional subdirectories. For instance, the flash subdirectory could contain subdirectories that group the advertisements by brand name.

As in feature and department subdirectories, an ENTRIES file is provided in each subdirectory which lists "title" filenames as well as filenames for short versions of the advertisements.

### Layout specifications

The layout format for the table of contents is unchanging, and it is explicitly defined within the EMAG assembling program. However, many layout designs for feature and department pages can be accommodated. These layouts are specified within two files, which are macro defined as FFORMAT and DFORMAT within *mag.h*.

A single feature page layout is specified within FFORMAT as a set of eight elements, one per line. Each of these elements consists of four numbers, which are the left, top, right, and bottom frame buffer coordinates of a

bounding rectangle. These bounding rectangles define the areas allotted to the date, title, author, illustration, story, first ad or related article, second ad or related article, and illustration caption, respectively. As mentioned earlier, the dimensions of the illustration for a page determines the areas allotted for text. Within the layout specification, the bounding rectangle assigned to the illustration indicates the maximum space that the illustration may fill. The actual dimensions of the illustration are employed to determine how much of this allotted space should, in reality, be used. The text areas bordering on this illustration are then adjusted accordingly. In fact, any text rectangle bordering on an illustration is typically incompletely defined within FFORMAT; the "adjustable" coordinate is initially assigned the value -1, as it is later redefined. Since some layouts are designed to contain no illustrations, or no main article text, the corresponding bounding rectangle is specified as four zeros.

Department page layouts are similarly specified within DFORMAT. Each consists of nine elements, one per line, and each of these elements consists of the four coordinates that define a rectangular area. The areas defined are, in order, the date, department name, author, one line lead, article, first ad or related article, second ad or related article, third ad or related article, and illustration. As above, if any item is not to be allocated any space within the layout, it is specified as four zeroes.

### 4.7.2 Program operation

A few noteworthy points concerning the EMAG assembling program are now discussed. Details concerning the source code are addressed in Appendix A.

#### Feature and department article processing

The EMAG assembling program initially assigns each feature indicated in FEATUREHOME a unique structure that maintains information about it. This structure includes the feature's location subdirectory and category. Notably, the structure also keeps track of the current position of the feature within the table of contents, the associated illustration currently displayed, and whether or not a more detailed lead has been exposed. This permits the table of contents to retain its previous "state" when the viewer chooses to return to it from elsewhere in the magazine.

Similarly, each department listed in DEPTHOME is assigned a structure, which includes the department's unique subdirectory. Because each department contains several distinct entries as listed in the ENTRIES file, each department structure contains a pointer to a linked list of the entries available. The distinct entries are ordered and inserted into the list according to the heirarchy described in Section 4.6.2.

All available features and all departments are likewise ordered according to this heirarchy prior to magazine display. This ranking employs the contents of the individual's personal magazine log (discussed in Section 4.6.2), as well as specific dates associated with either the feature or department

articles. The dates used are based on the "last modification" timestamp associated with the file.

Any item is trivially assigned the status "new" if the timestamp associated with its TITLE file is more recent than the last access date for the specific viewer. If this is not the case, a series of comparisons are employed to determine the item's status. These include checking if the article is "logged" within the viewer's history, and determining if any of the associated secondary files (e.g. the RELATED file within a feature's subdirectory) have more recent timestamps, thereby indicating the availability of some new material.

### Author and category lists

The EMAG assembling program maintains two special linked lists structures, which are constructed at the same time the structures for specific features and department entries are established. These lists are used to supply the viewer with information regarding *correlated articles* and specific author's writings (see Section 4.5).

The category list is actually an array of linked lists. Each element of the array represents a specific type of article available in the magazine. The linked list associated with each of these array entries contains the articles (either feature *or* department) which fall under that category. Each of these individual linked lists is constructed following the heirarchy previous mentioned, so that when, for example, correlated articles are displayed, the items of presumably greatest interest to the viewer are presented first.

The author list structure is composed of a linked list of linked lists. The

primary list contains nodes for each author. Each of these nodes points to a linked list containing the articles in the current edition written by that author. The article nodes are, once again, ordered according to the EMAG heirarchy.

As each feature or department entry is processed it is included in the appropriate category list. If the item has an author, then it is inserted within the author list structure.

### Text preparation and display

As described above, the EMAG assembling program has knowledge of the whereabouts of all material for a feature or department. When a certain page of the EMAG is requested, the program uses either the explicitly defined table of contents layout, or a file defined layout and prepares the textual material for display.

For each text file, a special file is created by a parsing function. This file contains all information required by the text display function, and bears the same name as the initial text file, with the addition of the suffix ".win." Once a file is parsed and the ".win file" created, it need not be parsed again. This allows frequently viewed pages, such as the table of contents, to be rapidly displayed on subsequent occasions. In fact, the EMAG program always checks to determine if the corresponding ".win file" already exists for a text file before parsing. This allows for greater efficiency in execution, as text files can be pre-parsed and the ".win files" stored within the appropriate subdirectories.

### Use of the personal profile

As mentioned earlier (see Section 4.6.1), a personal profile is created for each user when he or she calls the profile creation program and provides the information it requests. The profile creation program processes the information received, and stores certain "key word" character strings in the file ".magprofile" within the specific user's home directory. When the EMAG assembling program is initiated, it determines if this file exists. If it does, its contents are read into a special structure which is employed to aid in the selection of material for the magazine.

When an actual feature or department page is assembled, these "key word" strings stored in the profile structure are used as indicators for directories or files in which the program should look for relevant information. For example, if the EMAG program is preparing the presentation of the Workshops department, the profile structure is consulted for valid locations for the particular user. All indicated locations are compared with available workshop files specified in the ENTRIES file and bearing the names of distinct locations. Any corresponding files are displayed.

The profile is also used to locate advertisements of interest to the particular viewer when all of the related material specifically designated for inclusion with an article has been exhausted. For example, if the profile structure indicates that a viewer is interested in buying a zoom lens and owns a specific Minolta camera, an appropriate advertisement can be selected from the subdirectory ADDIR/zoom/minolta/ENTRIES.

# Chapter 5

# Room for Growth

The system developed is merely the basis for greater explorations into personalized electronic magazines. As the EMAG investigation progressed, many noteworthy ideas for specific expansion were generated. While some were incorporated, many others were not. A few of these interesting directions for further development of the EMAG are now considered.

## 5.1 Inclusion of sound and video

As previously indicated, electronic publications need not be restricted solely to text and static illustrations. They can readily incorporate other elements, such as sound and video. The inclusion of these elements could potentially serve to increase the instructional, informational, and entertainment value derived from the EMAG by the viewer. In addition, these elements can be personalized and made interactive in ways that further enhance the unique nature of the EMAG.

Incorporating video and sound could largely improve the educational

value of some articles. For example, a motion video of a certain color darkroom technique would offer greater guidance than the conventional magazine's use of a series of still photographs. Moreover, such demonstrations could be individually tailored; the viewer profile could aid in determining whether the right-handed or left-handed version should be shown. The viewer could also be provided with capabilities for examining this demonstration in slow-motion, reverse, or any number of other ways.

Likewise, video and sound could be used to enhance the power of advertisements, both for the advertiser and viewer. Consider, for example, an electronic computer magazine which contained an ad for the latest action game that *actually depicted* the "height of the action" in sound and motion. Coupled with an interactive element, it would provide great entertainment and information about the product for the consumer, as well as serve as an unparalleled communication tool for the advertiser.

The integration of elements such as sound and video could also aid in the creation of a highly personalized atmosphere for the presentation of material. The Editor-in-Chief of the EMAG could verbally introduce the current issue to the subscriber as he or she first viewed the table of contents. Making full use of inflection cues, the editor could explicitly point out an article addressing the viewer's new-found interest, and emphasize that a Letter to the Editor had been received regarding an article examined "last time." Similarly, department editors could give a brief overview of articles "in the works", and soon to be published. Use of sound and video in these ways would also serve to foster the magazine's distinctive character.

## 5.2 Increased functionality

There are a number of useful functions that could be introduced into the current EMAG implementation.

A current objection to many electronic publications is their lack of portability[14]. Until truly portable displays become reality, this will undoubtedly remain a deterrent to their use. Inclusion of print capabilities within a system such as the EMAG may be desirable in the interim, although a printed version would obviously lack most of the system's virtues. However, an EMAG print function could allow the user to select a subset of desired articles and indicate an explicit order for their printing. An individualized high-quality hard-copy version could then be made available to the user for reading on the subway, or at the beach. In this capacity, the EMAG would effectively function as the point of origination for an individually-tailored conventional magazine.

To a certain extent, the EMAG already strongly utilizes capabilities provided by electronic flexibility through its accommodation of various reading styles. This flexibility could be greatly enhanced by functions which allow the user to specify individual presentation preferences. It might be desirable to afford the user control over the type of media incorporated in the presentation of a specific article. For instance, the user could indicate if an article should take the form of a photo essay, an oration, a largely textual work, or any number of other possible combinations. Additionally, inclusion of an "information scale" function would be valuable. The user could

indicate if an article should contain a great deal of depth or, at the other extreme, take on the form of an abstract.

## 5.3 Increased individual customization

The user profile could include substantially greater information regarding the individual user. Its expansion could involve the addition of a multimedia database, which would enable greater personalization and potentially increase the effectiveness and comprehension of material. For example, photographs of the subscriber's home, or explicit details of the floor plan, could be employed to actually demonstrate decorative changes within a home improvement magazine. A fashion magazine could advise makeup selection and application, and actually include the individual subscriber's face in illustrations. In a magazine such as *Popular Photography*, the subscriber's own photographs could be used to illustrate a certain cropping technique.

In the current implementation, the editors and subscriber effectively *work together* to select appropriate content for presentation. This concept could be broadened to allow the user to also exert influence on the design. For instance, a specific viewer might prefer a slightly larger type size to accommodate easier reading. The editorial staff could provide a selection of fonts deemed stylistically suitable, from which a selection could be made based on individual preferences. Similarly, a viewer might find a certain new layout or other stylistic change distasteful; these offensive elements could be excluded from further use. Moreover, a user might prefer to be

"verbally", as opposed to graphically, informed when the end of an article has been reached, or all feature entries in the table of contents have been viewed. The subscriber could be provided with the ability to specify such preferences through the addition of an individualized "design" profile.

# Chapter 6

# Concluding Remarks

> *... Electronic publications will come into their own when they are designed, ab initio, to capitalize on the true capabilities that electronics can provide: a reorganizable, dynamic text and dynamic illustrations ... The true electronic publication will allow the user to interact with it in a way that print on paper cannot do. We have reached the limits of what can be achieved with print on paper as a communication device. In contrast, the surface of electronic communication has hardly yet been scratched!![22]*

The work herein presented addresses an application of electronic publishing previously not explored—the electronic adaptation of the special interest mass circulation magazine. The investigation demonstrates some of the possibilities for a new communications medium, which would serve to provide individuals with an easily accessible storehouse of personally relevant information.

The actual implementation borrows basic notions concerning functionality, structure and style from conventional magazines. However, the EMAG distinguishes itself from a standard publication in a number of important ways. Local computer control affords the user powerful methods for exam-

ining an edition. The actual interaction techniques more closely approximate a high level, intuitive programming environment than standard magazine reading technique. Each edition of the EMAG personally addresses the individual; his or her interests actually guide the content presented. As the user's interests change and evolve, the EMAG also changes and evolves. In fact, its "continuously published" nature allows even previously published material to reflect these changes.

# Appendix A

# Programming Details

## A.1 Source Code

The source code for the EMAG implementation discussed in this thesis can be found in the directory **/u/gitta/mag/demo/c** on the Sun Microsystems computers within the Electronic Publishing Group at the Media Laboratory. A "makefile" is provided within this directory to ease compilation.

What follows is a brief description of the files that make up the system. All programs were written in the C programming language under Berkeley UNIX[1], version 4.2.

### A.1.1 Header files

**mag.h** This is the main header file for the magazine and contains information regarding all of the structures employed.

[1] UNIX is a trademark of AT&T Bell Laboratories.

**options.h** This header file contains macro definitions for viewer command options.

**profile.h** This header file contains the macros and structure definitions associated with the viewer profile.

**win.h** This header file contains macros and structure definitions used in text parsing and display.

### A.1.2 Source Code Files

**color.c** Contains color assignments based on the color map "magcm."

**debug.c** Contains utilities for use in debugging.

**fileutils.c** Contains utilities which involve external files.

**log.c** Contains utilities which manage the viewer history or log.

**magprofile.c** This source file contains all code necessary to produce the viewer profile creation program.

**main.c** Contains the function *main()*, as well as initialization functions for the magazine.

**set_up.c** Contains functions which guide the initialization of feature and department structures, as well as their "ranking." Also contains functions which guide the set up of the table of contents.

**tsd.c** Contains all functions addressing the touch sensitive display.

**utils1.c and utils2.c** These files contain various functions which guide the display of feature and department titles, authors' names, leads and illustrations within the table of contents.

**utils3.c** Contains functions which guide the construction and display of a feature page.

**utils4.c** Contains functions which guide the display and construction of a department entry page.

**utils5.c** Contains functions concerning the linked list of authors and their contributions.

**utils6.c** Contains functions concerning the linked lists of entries for each department.

**utils7.c** Contains functions concerning the linked lists associated with article "categories."

**windisp.c** Contains functions which guide the actual display of parsed text files.

**winparse.c** Contains functions which parse text in preparation for display within certain regions.

## A.2 Executable Code

The *Popular Photography*-based electronic magazine discussed in this thesis can be run by issuing the following command:

**/u/gitta/mag/demo/mag [options]**

where valid options are:

-k keyboard input

-t touch sensitive display input

-f process and display features only

-d process and display departments only

At least one of the options "-t" or "-k" must be supplied.

A magazine viewer's profile can be established for the user currently logged on to the system by invoking the command:

**/u/gitta/mag/demo/magprofile**

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