The Impact of Technology on the
Production and Distribution of the News

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Part I: Computerized Newsrooms

When the computer first was introduced to postwar America, it was portrayed as a friendly robot, a machine capable of vacuuming the floors for the beleaguered housewife, an electronic brain that could play chess and other games requiring highly developed skills. Like its technological predecessor, the telephone, it was thought of as an adult toy. Its practical use in the business world was not at first envisioned.[1] It was termed *artificial intelligence*, just as the printing press in its incunabula period was termed *artificialiter scribere*—artificial writing. Few, if any, persons envisioned the present applications of the computer for booking airline reservations or selecting rookies in the National Football League's annual draft. Least of all was the application of the computer to the newspaper world considered.

Publishers turned to the computer, with varying degrees of success, to solve problems which the industry faced as it entered the decade of the 1960s. Once the new technology arrived in the pressroom, however, it precipitated the reemergence of an age-old problem: man versus the machine—a problem which dates back to times when a civilization based on the pasture and the plough gave way to one based on industry. Besides its impact on the ranks of labor, the computer, once it entered the newsroom itself, transformed the organization of the press. It has made possible the development of small papers which operate as satellites to larger metropolitan dailies. In other words, the future holds the possibility of a growth of electronic newspaper networks.

The task of this article is threefold. First, I will cover the historical circumstances leading to the adaptation of the computer to the newsroom, and give a thumbnail sketch of the uses to which it has been put. Second, I

will make note of the impact the computer has had on labor. Finally, I will investigate how the new technology has made possible the development of satellite presses.

Historical Circumstances and Technological Change

As recently as 1965 most newspapers in this country were using equipment largely unchanged since the last decade of the nineteenth century.[2] By 1900 automation had transformed the newspaper into a full-blown industry. The typesetting machine which Ottmar Merganthaler invented in 1886, and the stereotype and the rotary press, all worked together to turn the Fourth Estate into an efficient enterprise capable of producing a large number of papers in a relatively short period of time. The Industrial Revolution, begun in earnest in the United States at the onset of the last century, created dense city populations. At this time the press was transformed to meet the needs of industrial society. Its method of distribution changed. In the 1830s the newsboy appeared on the streets of Boston and New York and peddled his wares to the people. He fitted the lifestyle of a new kind of audience, one composed of mill workers, for instance, who could not afford the price of a subscription payable in advance. With the onset of the twentieth century, the industry experienced a technological hiatus that lasted until the 1950s when small weekly newspapers began to experiment with offset printing.[3]

The news industry has, with a remarkable degree of success (given the short period of time), adapted both computer and satellite to its own ends. What appears at first glance to be a sudden and widespread adoption of computer systems, including electronic editing, was more the gradual and at times painful task of converting the new technologies to solve seemingly overwhelming problems facing newspapers during the 1960s.

At first, publishers blamed their declining revenues during the late 1950s on alternative information sources. The scapegoat, in their eyes, was television.[4] Advertisers, it seemed, were spending their dollars on the medium that would transcend geographical boundaries. Television appealed to advertisers because it appeared to be a better way to organize the consumer market. In reality, the crisis confronting the newspaper industry could not be laid solely on the doorstep of the fledgling television industry. The economic straits newspapers found themselves in were the result of a complicated interweaving of many different forces. For example, the implementation of the postal zip code in 1962 helped advertisers distribute their material via direct mail rather than by way of the newspaper ad.[5]

However, the loss of revenue attributable to the zip code was a secondary tributary to the real crisis: the decline of the central city. For well over

a hundred years, since the bawdy days of the penny press, the newspaper had belonged to the city, and the city in the late 1950s and early 1960s had evolved from an exciting, thriving metropolis to a ghetto beset with alarming crime rates and race problems.[6] The era of James Gordon Bennett—an immigrant who had arrived in New York City disillusioned and deep in debt, who at forty thought his life was over and who subsequently became the chief architect of the penny press—had passed away. Gone were the days of cutthroat city competition, the likes of which press notables William Randolph Hearst and Joseph Pulitzer had thrived on.

Editors of today, however, were slow to recognize the changes going on around them. Fundamental and far-reaching transformations had affected the structure of the postwar family and the pattern of the laborer's workaday world. When the 1960s began, the news industry was in trouble: "Everything about the newspaper suddenly began to seem wrong."[7] The cost of newsprint had skyrocketed. Papers were produced in areas distant from their readers and thus required delivery over busy city thoroughfares to suburbs. Also, they depended for their production on organized labor which was becoming increasingly expensive.[8]

The Computer's Adaptation to the Newsroom

In the pioneering stages of computer adaptation to the newspaper, production and business tasks were the target for change. The computerized systems used in the industry, then, were designed not with the editor or reporter in mind, but rather for the people working in the business offices. As such, these operations, because they are common to virtually all businesses, did not require programmers to adapt their "packages" specifically to newspaper use.[9]

The newsroom and the advertising departments, the "front end," were the last to utilize the new technologies. During the pioneering stages of computer experimentation in the early 1960s, individual papers made piecemeal and at times secretive attempts to adapt the computer to the newspaper's special tasks. The early systems were cumbersome and crude, and required elaborate coding. They promised much but delivered little. Their benefits were offset by their primary drawbacks: the need to rekeyboard material and the problems involving on-line storage. The breakthrough came in 1961 when MIT demonstrated the first time-sharing computer. After 1965, when time-sharing became commercially viable, there was a rapid increase in the use of the computer in the newsroom.[10]

As shown in Table 1, the number of video display terminals (VDT) has increased from a modest 23 in 1970 to over 15,000 in 1978. A cautionary note must be introduced into any discussion of numbers of electronic and computer units. Although real numbers are sizable, the actual number of

TABLE 1. GROWTH IN NUMBER OF ELECTRONIC AND
COMPUTER UNITS IN NEWSPAPER APPLICATIONS

Year	OCR Typewriters	OCR Units	VDT Units	Computers
1978	22,237	712	15,841	1,982
1977	23,538	738	9,867	1,472
1976	21,384	671	7,038	1,206
1975	18,778	543	3,896	971
1974	13,819	377	1,666	800
1973	6,107	186	685	719
1972		87	360	707
1971		16	155	632
1970			23	537
1969				529

Source: Puncekar, Sandra L., ed. "Electronic Applications; O.C.R.—V.D.T.—Computer; ANPA Member Newspapers, 1978." *ANPA R.I. Bulletin*, 1979, p. E-5, Table 1. (Reprinted by courtesy of ANPA Research Institute.)

papers using the computer in the newsroom—as distinct from the pressroom—is about 600, or 3/8 of the total number of papers in the United States.[11] Nevertheless, the trend is not insignificant.

Detailed listings of the numbers and types of equipment used, as well as their functions, were compiled by the American Newspaper Publishers Association (ANPA) Research Institute and are partially reported in Tables 2, 3 and 4. The data in the tables are based on responses to a special questionnaire sent to ANPA member newspapers. The purpose of the questionnaire was to determine the extent to which electronic devices are used throughout newspaper departments.[12] Table 2 indicates that nearly all responding newspapers use electronic devices for editing and reporting purposes. Table 3 arranges the data in terms of circulation figures. Table 4, which lists the number of VDT units per paper, shows that about half of the papers responding use fifteen or fewer units.

Fifteen years ago there was not an electronic editing system around. Today a significant number of newspapers in this country use them. In fact, there are currently some journalists who have never handled copy in any other way.[13] With the aid of portable terminals small enough to fit under an airplane seat, the journalist is able to submit his copy directly from a political convention, the sports arena, or the scene of the crime. In using the computer to write his story, the reporter can revise, add or delete instantaneously. If a sentence or paragraph is no longer needed, it can be made to disappear with the press of a button. The result is copy that is

TABLE 2. List of Departments Utilizing VDT
Units, Number of Newspaper Offices Using Them,
and Number of Units Used

Functions and Departments Reported Using VDT Units	Number of Newspaper Offices	Number of VDT Units
Editing	423*	5,632
Classified department	273	2,313
Reporters	239	3,188
Composing room ad makeup	194	659
Composing classified ads	150	377
Composing text keyboarding	138	587
Business and accounting	130	540
Bureau	76	482
Business and circulation	68	608
Portable	64	317
Composing room	44	169
Display advertising department	36	105
Composing ad makeup	18	43
Composing proofreading	16	48
Newsroom	12	98
Data processing	11	69
Composing room page makeup	11	52
Computer room	9	21
Library	8	47
Remote advertiser	8	15
Programming	7	20
System monitor	6	9
System management—classified or display advertising	5	30
Service department	4	9
Composing typesetter control	3	6
System management—news	3	3
Production control	3	3
Sports and Sunday	2	11
Commercial work	2	7
Business power control	2	4
Remote advertising areas	2	2
Power consumption panels	1	50
Building security	1	13
Journalism lab	1	12
Display ad lines	1	10
Reader insurance	1	4
Press totalizer	1	4
Credit	1	2
Editor's page makeup	1	1
Composing ad makeup	1	1
Business circulation	1	1
Unknown—not identified	27	189
Totals	517	15,761

*Includes newspapers that use VDT units for editors and reporters (depending on copy flow).
Source: Puncekar, Sandra L., ed. "Electronic Applications; O.C.R.—V.D.T.—Computer; ANPA Member Newspapers, 1978." *ANPA R.I. Bulletin*, 1979, p. E-8, Table 5. (Reprinted by courtesy of ANPA Research Institute.)

TABLE 3. NUMBER OF NEWSPAPERS REPORTING
USE OF OCR AND VDT UNITS ACCORDING
TO CIRCULATION RANGES

Circulation Range	Newspapers Using OCR Units	Newspapers Using VDT Units
Up to 5,000	-	10
5,000 - 10,000	12	37
10,000 - 15,000	18	50
15,000 - 20,000	23	45
20,000 - 25,000	17	39
25,000 - 50,000	98	148
50,000 - 75,000	45	69
75,000 - 100,000	17	20
100,000 - 150,000	22	32
150,000 - 200,000	17	22
200,000 - 500,000	22	29
500,000 - 1,000,000	4	7
More than 1,000,000	-	-
Totals	295	508

TABLE 4. NUMBER OF VDT UNITS
PER NEWSPAPER

Number of VDT Units per Newspaper	Number of Newspapers
1 - 5	82
5 - 10	79
10 - 15	70
15 - 20	49
20 - 25	49
25 - 30	23
30 - 35	22
35 - 40	21
40 - 45	19
45 - 50	15
50 - 60	10
60 - 70	14
70 - 80	9
80 - 90	9
90 - 100	4
100 - 150	20
150 - 200	6
More than 200	7
Total	508

always "clean." Depending on the policy of the individual paper and the extent of its computerization, reporters can use computerized data banks to do background research for their stories. Journalists have instant access to wire service news, stories written by colleagues, abstracts of articles on related subjects, and an index to the paper's morgue.[14]

Besides reporters, editors utilize VDTs and optical character readers (OCR). Before the advent of cold type,[15] the proofreading of the text was performed in the composing room. Most typographical errors were due to rekeyboarding and the linotype machine. Proofreading today is done in the newsroom and ultimately is the responsibility of the editor.

Advertising

The area in which the computer has been used with a good deal of success is classified advertising.[16] VDTs can be programmed with a standard form. By the time the operator has filled out the form, the computer will have done such tedious editing steps as hyphenation and justification. The screen will display the cost of the ad; it will indicate whether the advertiser is a poor credit risk; and finally, it will display the total number of ad lines slated for that particular edition. The computer has the added advantage of being able to handle ads for different papers, and for different editions and zones of the same newspaper.

The electronic classified system of advertising minimizes paper-handling—ideally at least—and produces output with a minimum of human intervention. Display advertising, on the other hand, is a totally different story. Display copy is the result of the efforts of several people, including many who do not work for the newspaper. Most often the copy is made up days or even weeks in advance, a factor which makes on-line storage expensive and almost impossible. A small number of electronic layout systems are available to newspapers today. Contrary to classified ads, which can be automatically processed by computer, display ads require much more proficient operators.

Those few layout systems which do exist position display ads in a newspaper edition. They operate quickly and with some versatility. Always, however, the operator is able to modify computer-made decisions. The full-page composition and makeup terminal is usually a stand-alone unit, the input and output of which is paper tape or magnetic tape. The operator at a typical work station is able to perform the standard composition, layout and editing functions—specifying type face and size, line length and spacing. In addition to its use in advertising departments, the computer has been successfully adapted to the major wire service operations.

Wire Services

United Press International (UPI), The Associated Press (AP) and others provide their subscriber newspapers with low- and high-speed wire service transmission. UPI began its relationship with the computer in 1965 when it switched from radiocast transmission to Transatlantic Pictures Plus News Communications System. At the time, the new system gave UPI a transmission capacity equivalent to ten two-way telephone channels operating at sixty words a minute—a remarkable expansion over the previous system. In July 1975, however, UPI switched to an Information Storage and Retrieval System (IS&R) that made the earlier developments look like a crude and clumsy attempt to increase the flow of worldwide news. With well over 450 terminals tied to IS&R, UPI had the distinction of being the first news agency in history to use a completely electronic system for writing, editing and distributing its news services. The electronic system made possible the development of DataNews, UPI's high-speed wire service. DataNews and AP's DataStream service offer direct input into subscriber computers. The subscriber computer then monitors the wires and selects, with the help of a standardized coding system, the stories suitable to its needs.[17]

Gradually, then, publishers have turned to the computer to solve economic problems facing the industry in the 1950s and 1960s. Once the computer entered the pressroom, however, it precipitated an age-old struggle: laborer versus employer.

The Reemergence of Man vs. Machine

Charles Babbage, who in 1833 constructed the first computer, an analytical engine, refers to the problems between management and labor in his treatise, *On the Economy of Machinery and Manufactures*. Workmen long have thought that their interests and those of their employers were mutually exclusive. The difficulty, Babbage thought, that the man-versus-machine contest gave birth to was a neglect of valuable machinery, and, in consequence, an almost certain neglect of improvements in production.[18] When the computer was finally adapted to newspaper use, however, the winner of the man-versus-technology struggle seemed to be the computer—hands down.

The impact of the new technologies on the industry was first and most painfully felt in the ranks of labor. The plain fact of the matter is that the computer does not require as many hands or as much skill to operate as the linotype. For publishers, the computerized production was a reassuring step toward freeing the industry from one of its most troubling characteristics: the newspaper was a "labour-intensive medium at a time when skilled labour was becoming well organised and very expensive."[19] What was seen

by publishers as a promise was viewed by labor as a threat. Their job security was at stake.

In the United States, the most recent and widely publicized confrontation between labor and publisher took place in New York. The principals in the drama were the Printing Pressman's Union #2 and the Publishers' Association of New York City, representing the *Times*, the *News*, and the *Post*. The Printing Pressman's Union had not struck since 1923, the last time manning agreements had been reached. During the technological adaptations in the 1970s, publishers had made it clear that the manning levels agreed to in 1923 were no longer viable. In 1976 the *Times* announced that manpower reduction would be its major objective in the coming year. In April 1977 Arthur Ochs Sulzberger, chairperson and president of the company, told stockholders that manning was the most serious and pressing problem facing New York's leading newspaper.[20] The upshot was that in August 1978 publishers proposed terms which gave management the authority to determine the size of crews. The pressmen walked out of the negotiations and publishers predicted a long strike. The president of the Allied Printing Trades Council declared that New York was a union town and that there would be no *Washington Post* scene in the nation's largest city.[21] What ensued was a strike which lasted eighty-eight days and ultimately kept the city in a veritable news limbo.

At no time during the lengthy strike were wages an issue or stumbling block. Job security lay at the heart of the issue. When a tentative 6-year agreement was reached between parties, both sides called it a victory.[22] The pressmen received job guarantees, but conceded manning reductions, through attrition, of 20-30 percent.[23]

The Rise of Computer Networks and Satellite Papers

Besides effecting changes in the ranks of labor, the computer has enabled the editor to come to terms with the news demands of changing demographics. With the great population shifts from the city to the suburb during the 1950s and 1960s, the newspaper industry found that it had to reorganize itself to meet the needs of its suburban audience.[24] The expansion of the great metropolitan dailies into the suburbs generally took the form of zoning, with news bureaus established in outlying population centers. A certain number of pages in each edition were assigned to regional news produced by these bureaus, and one or more suburban editions were distributed in the area. The *Los Angeles Times* recently went a step further and set up a bureau in San Diego.[25]

Besides zoning, the computer has made other visible alterations in the organization of the newspaper. It makes possible the establishment of newspapers which are satellites to larger, metropolitan journals. A case in

point is the *New Jersey Bulletin* which serves the New Jersey market but is published by the Philadelphia *Bulletin*. Replete with editorial staff, a classified and display advertising crew, a mailroom operation for handling preprints and a circulation department, the headquarters of the satellite paper is located in Pennsauken, New Jersey. However, it is tied by computer to and uses the composing and pressroom of the Philadelphia plant.[26]

The philosophy underlying the formation of the satellite newspaper is that a newspaper must be responsive to the local needs of the readers. It is only with the aid of the computer that operation of a network of editorial staffs is at all possible. The network of computers used in Pennsauken and Philadelphia allows the satellite paper immediate access to the Philadelphia facilities. At the same time, the New Jersey operation produces a paper entirely different from the one produced in Philadelphia. The New Jersey newsroom has eleven editorial terminals which editors and reporters use to write, dispatch, correct, edit and file their stories. In addition, each terminal has a memory system capable of storing the equivalent of 125 column inches of news copy. All terminals are linked to computers in Philadelphia via telephone lines. Through this linkage, the satellite paper has access to any story, directory or listing in the system which is available to the Philadelphia staff.

After stories are written and edited, the news editor retrieves them, decides where they should go, and then advises copy editors about copy length, headline size and other miscellanies. When copy editors are finished with their work, the stories are released to phototypesetters. Page dummies (of a color different from that of the Philadelphia paper) are sent to the composing room where an entirely separate set of plates is made. The finished product of this computerized editorial and production system is a newspaper that is substantially different from *The Bulletin*.

Another kind of network newspaper is the San Diego edition of the *Los Angeles Times*. While it is an attempt to participate in the growing market San Diego offers, the *Los Angeles Times* edition specializes in regional, national and international news. It is somewhat less strong in the area of local news and sports.[27] The point is that there are two distinct possibilities for the future of the newspaper. On the one hand, computerized production of the news may encourage the further development of newspapers aimed at special audiences—much like format radio. Since newspapers, like radio, draw the majority of their revenues from local as opposed to national advertising dollars, this seems a likely development. At the same time, the development of a national newspaper or a number of national newspapers through computerized interconnections is a distinct possibility. At present we are in a period of technological dislocation. Like any period of dislocation, trends are contradictory, chaotic and unclear. No

particular development stemming from the use of the computer in the newsroom is absolutely certain.

Least certain is the total demise of the newspaper in its present form. Critics have been predicting the death of the newspaper since the 1930s.[28] Those who maintain that the newspaper of tomorrow will be distributed via the home television set point to the pilot study being conducted by the TV station KSL in Salt Lake City, which is investigating teletext delivery of information to the home TV viewer. Although the electronic newspaper is currently a popular topic, critics who predict that the paperless world is just around the corner do not take into account present-day trends in the production of newsprint. To be sure, the primary drawback of offset printing is newsprint waste, and newsprint costs have doubled in the last ten years. They are second in magnitude to the cost of labor.[29] However, the computer is being used in the newsprint industry to help publishers pinpoint factors contributing to waste. Likewise, other methods of keeping costs down—such as newsprint recycling—are being utilized.[30]

Conclusion

Once we successfully muzzle the technological optimists who predict that Ceefax will do away with the news*paper*, we still have to contend with the technological pessimists. These are the ones who associate the computer with the dehumanization of humankind. They link the use of computer-based information systems to a poverty-stricken notion of knowledge and an ever-diminishing store of cultural products—such as great literary works.[31] As for its application in the Fourth Estate, critics of the computer lament the possibility of a completely electronic newspaper. The world without a morning paper to read over the first cup of coffee is a drab and dreary one indeed. Nothing we can say will completely assuage the fears of technological pessimists. However, it might be beneficial to point out that Socrates once decried the invention of writing because he thought it wrought havoc with the memory. Abbot Trithemius once warned against too much reliance on the printing press, for it would never be as good as handwriting. Although writing transformed the human memory system and the printing press altered the uses of handwriting, neither was completely done in by the new inventions. In the same way, it is doubtful that the computer will transform beyond recognition or undermine the importance of the newspaper in our everyday lives.

ACKNOWLEDGMENTS

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15. "'Cold type' is used as a descriptive phrase in the newspaper business because 'hot' molten lead is not used in this process; instead print images of copy and illustrations are produced and copied photographically on paper." Udell, op. cit., p. 98.

16. All descriptions of computer use in newspaper advertising are taken from Moghdam, op. cit., pp. 94-98, 111-21.

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