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**THE DEVELOPMENT OF COMPUTER-ASSISTED REPORTING**

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## THE DEVELOPMENT OF COMPUTER-ASSISTED REPORTING

### Abstract

Computer-assisted news reporting refers to anything that uses computers to aid in the news-gathering process. The introduction of computers in the newsroom has been a gradually developing process that must be traced back to early computing devices. Later advances included inventions by John Napier, Blaise Pascal, and Charles Babbage. A breakthrough in computing was the invention of Herman Hollerith's Tabulator and Sorter. Soon after Howard Aiken developed the Mark I computer. By the 1950s, the computing revolution had begun. The first actual instance of computer-assisting reporting was with the 1952 presidential election when CBS employed the Remington Rand UNIVAC to predict the outcome of the race between Eisenhower and Stevenson. A decade later several pioneers such as Philip Meyer and Elliot Jaspin began to successfully initiate new computing techniques for reporting. Computer-assisted news reports by Clarence Jones, David Burnham, Don Barlett, and James Steele soon followed. By the 1980s microcomputers became commonplace and their introduction into newsrooms occurred in several stages: first, individual reporters bought their own computers; later, organizations purchased them; initially microcomputers were primarily used for word processing but one of the newer purposes was to connect to online databases. Computer-assisted reporting has recently found great success in newsrooms across the country, but it only came about because of the initiative of a few pioneers. For computer-assisted journalism to become so successful, it was necessary for basic reporting skills to already be in place.

## **THE DEVELOPMENT OF COMPUTER-ASSISTED REPORTING**

If a person were to walk into a newsroom today, he or she would likely find reporters and editors busily hunched over computers working on stories. But how are these journalists using those computers? Are they simply using them for word processing or for something else? Since computers entered the scene, reporters have been taking advantage of them. But how and when did computers enter the newsroom and how have reporters used them to assist in their reporting? Questions arise as to whether the introduction of computers in the newsroom was a gradual development or if it was more of an individual-driven phenomenon. The proposed hypothesis is that it was the latter case.

To answer the research question, this paper will examine the general history of computer-assisted reporting by tracing its beginnings in this country from the early computing days to the introduction of mainframe computers to the modern systems used today. This paper will then turn to primary sources to see exactly what computer assistance entails in reporting at the brink of the 21st century. Ultimately, this paper will demonstrate that the introduction of computers in the newsroom has been an individual-driven movement that has only spread to the general population of practicing journalists with the initiative of a few pioneer reporters.

### **The Development of Computers**

The concept of computer-assisted reporting (CAR) is a broad one. It encompasses, as Garrison (1998) explains, anything that uses computers to aid in the news-gathering process. It can involve online research and database journalism. It is sometimes called computer-assisted journalism.

The introduction of computing in the newsroom goes back to very early computing devices that were around since prehistoric times. But the first significant computing device came in the late 1880s

with an invention by Herman Hollerith. Hollerith can perhaps be considered the founder of modern computing with his invention of the punched card, which salvaged the analysis of the 1890 census. The punched card was an index card divided into quarter-inch squares. Each square represented binary information: a hole in the square meant "yes" and no hole meant "no." Hollerith then invented a machine for reading 40 holes at a time called a Tabulator. This machine read whether or not there was a hole in the card. If there was a hole in the card, spikes would pass through the card and land in a cup of mercury. This triggered an electrical current that caused the counter to move forward to the next hole. If there was not a hole the spike would stop. In addition, Hollerith invented a Sorter, which allowed for the sorting of cards (Meyer, 1991).

Although Hollerith's invention was prompted by a need of the government, it wasn't long before computing spread to business and industry. Soon Hollerith's inventions were serving industry leaders in payroll, inventory and accounting tasks (DeFleur, 1997). In 1911, Hollerith sold his Tabulating Machine Company and in 1924 its name was changed to International Business Machines (IBM) (Bashe et al., 1986).

The next advance in computing came in 1936 when Howard Aiken, building upon ideas that were centuries old, developed the Mark I computer at Harvard (Cohen, 1999). J. H. Muller, a German, had actually conceptualized a machine for performing mathematical calculations by using encoded data in 1786, but he was ahead of the technology available. What was needed were three components: something to store data and instructions, a device for doing arithmetic and something to monitor information as figures entered and came out as processed data. In 1912, Charles Babbage tried to build such a machine but found, as Muller did, that the technology wasn't available. When Aiken started work on the Mark I, he used many of the same devices for which Babbage had already anticipated the need. The terms that Babbage came up with, a *store* to keep raw data and a *mill* to do

the computations, are today known as memory and central processing unit (Meyer, 1991). Aiken's machine was powered by electrical relays. It was eventually put to work for the U. S. Navy during World War II.

At the same time as the Mark I was being developed, the U. S. Army was developing a machine to help it with ballistics problems. Begun at the University of Pennsylvania, the machine was based on an invention built at Iowa State University by John Vincent Atanasoff and his graduate assistant, Clifford Berry. This machine was called the Astanasoff-Berry Computer (ABC) (Lee, 1995). The device the Army employed was called ENIAC and used vacuum tubes, resistors, and capacitors instead of mechanical relays. But it was Atanasoff who is identified as the founder of modern computing (Meyer, 1991).

Prior to the 1940s, the word "computer" referred to a person who performed calculations. By the 1940s, this term began to refer to a machine that performed computations. By the end of the World War II the notion of electronics-- the science that concerns itself with the behavior of electrons in various kinds of substances and environments-- was developing. For the period following the 1940s, Meyer (1991) identifies three stages in computing machinery identified as such by the main electronic device that was used. The first wave included such instruments as ENIAC, which used vacuum tubes. The second wave used transistors such as in the IBM 7090. The final wave used integrated circuits such as in the IBM 360 series.

Through all these stages of computing there was still one problem: the computers were not easy to use. This is where Grace M. Hopper of Remington Rand made contributions. Her greatest, perhaps, was the invention of the first assembly language in 1952. Hopper's invention led to the concept of compilers, which were designed to use assembly languages on different machines (Bashe et al, 1986).

## **Computers and journalism**

According to Birkhoff (1980), by the mid 1950s the United States entered a new age in computing with the extensive introduction of computing in business and industry. Special computer languages were developed and computers began to be used more in applied sciences and in the military. And once again the U.S. Census, this time of 1950, benefited from the advances of the computer. But it wasn't until the 1952 presidential election that the age of computer-assisted news reporting began.

The candidates were Dwight Eisenhower and Adlai Stevenson. The election was predicted to be a close one and was monitored closely by Walter Cronkite, then the Washington correspondent for CBS News. The computer was the Remington Rand UNIVAC (Universal Access), which was employed to predict the outcome of the election based on early returns. Computer programmers had prepared formulas based on partial returns. Despite widespread thought that the election would be close, early predictions on the part of the computer said that Eisenhower would win by a landslide. Officials at CBS were reluctant to broadcast such seemingly impossible predictions so they stalled for hours. When they finally broadcast the predictions, they were ridiculed for having refused to believe the computer. The age of computer-assisted reporting was born during this election. Not an election has passed since 1952 that computers have not been used to predict outcomes.

Following the 1952 election, the introduction of computers into newsrooms proceeded in what Reavy (1996) categorizes as three overlapping phases. These three phases were business, production and information. During the business phase, the use of computers was mainly for the purposes of accounting and circulation (Reavy, 1996). By the middle of the 1960s, computers were on hand in the newsroom for tasks as diverse as inventory control to wire editing. By the 1970s, newspapers began to use computers for production as well, which led into the information phase.

University of North Carolina Professor Philip Meyer can be credited as one of the innovators of computer-assisted reporting in the third phase with his coverage of the Detroit riots in 1967 (Meyer, personal communication, November 1, 1999). He conducted a survey among African-Americans during the Detroit riots and along with John Robinson and Nathan Kaplan at the University of Michigan employed the use of an IBM 360 mainframe to analyze survey data (Reavy, 1996). The analysis revealed that, contrary to the assumed hypothesis, people who had attended college were equally likely to participate in riots as were high school dropouts. The story won him a Pulitzer Prize and signaled the beginning of a new era in computer-assisted reporting.

What got Meyer started was learning Harvard Data-Text, a higher-level language for the IBM during his year as Niemann Fellow. He studied the use of social science research in journalism (Meyer, personal communication, November 1, 1999). Ironically his objective was not so much to find computer applications but to apply social science research methods to journalistic practices. After his Detroit riot story, he moved to Washington, D.C., where he continued to be a pioneer in the U.S. by being the only journalist to regularly use a computer in his work (Reavy, 1996).

The year after Meyer's innovating advances, Clarence Jones of *The Miami Herald* hired University of Miami law students to enter court records into a computer. Collaborating with Clark Lambert, the newspaper's systems manager, he used computer cards and a COBOL program to analyze the 13,000 keypunch cards and uncovered bias in the Dade County criminal justice system. The analysis, entitled "A Scientific Look at Dade Crime," turned out to be the "first journalistic use of computers to analyze government records," and became the start of public service journalism which has become "a mainstay of everyday reporting," (Maier, 1999).

While Jones' work progressed, Meyer developed further advances using social science methodology in journalism. The year after Jones' story in 1969 Meyer began a book in praise of the

media's use of statistical research. In 1973, this book was published as *Precision Journalism*. Meyer was to publish in 1991 an updated version of his book, called *The New Precision Journalism*. In this book, Meyer explains that beginning in the 1970s, journalism started to become scientific, a journalism which he labels as precision journalism. He says that in the 1970s journalism started to become scientific in two ways. First, vast amounts of information started to become available to journalists because of the introduction of computers. The second way had to do with circulation. Because newspaper circulation did not stay on the same level as growth in households, publishers started taking more note of the marketplace and noted what made readers more likely to buy particular newspapers.

In being scientific, journalism involves knowing what to do with data. Meyer (1991) identifies six steps to follow when using data. The first is to collect the data. Second, one must store the data, preferably on computers. One must be able to retrieve the data stored not only by one's self, but also those stored by others. Journalists must be able to analyze data and search for patterns. With a large amount of data a journalist must be able to reduce it. Finally, a journalist must be able to communicate data.

What enables Meyer (1991) to classify journalism as a science is his explanation that journalism and science share some of the same characteristics. The first is that in both fields one must be skeptical and never believe information until checked out for one's self. Journalists and scientists must be open and allow others to conduct the same research. Journalists and scientists must have an instinct for operationalization. Operationalization is the concept of finding an observable and testable model. A fourth characteristic shared by journalism and science is that there must be a sense of the tentativeness of truth. When choosing between absolutism and relativism, science more comfortably chooses relativism. Finally, journalists and scientists must be parsimonious.



But, before the publication of Meyer's book, there were further advances by other innovators. In 1972, for example, David Burnham, then affiliated with *The New York Times*, used a computer to analyze records from the New York City police department. He acquired population figures, crime reports, and arrest statistics from New York City's precincts and analyzed this information with a computer. Ultimately his report revealed discrepancies among the numbers and rates of crimes reported in the city and the arrests made in different precincts (DeFleur, 1997).

Further advances in computer-assisted reporting came in 1973, Reavy (1996) explains. In February 1973, a new interactive information system became available to the public by *The New York Times*. In the same month *The Philadelphia Inquirer* ran a series of computer-assisted reports entitled "Unequal Justice." Philip Meyer assisted Don Barlett and James Steele in analyzing sentencing trends by inputting the city court system's paper records into computer-readable form. It was to be Meyer's first experience in analyzing government records.

The next major movement in computer-assisted reporting in 1973 was again developed by Burnham for *The New York Times*. For this story, Burnham wanted to uncover the relationship between fear of crime and a fear of white middle and upper class residents that they had a high probability of being the victim of crimes initiated by blacks. He analyzed court records and arrest reports and used a computer to analyze the figures to show that in New York City a black person was eight times more likely than a white person to be murdered.

By 1978, Rich Morin and Fred Tasker of *The Miami Herald* were taking advantage of databases that were already computerized. For a story on unfair real estate pricing in the Miami area, the two reporters analyzed a tape containing tax assessment records for Dade County, Florida. Meyer once again came in with assistance in his role as consultant to the *Herald*. In analyzing the computer

tape, Morin and Tasker were spared from having to enter all the data. The results revealed that there were indeed discrepancies in the assessment of property value in Dade County.

By the 1980s, microcomputers became commonplace. This came after a trend toward miniaturization that began in 1971 with the Ted Hoff invention of the microprocessor at Intel Corporation (Shurkin, 1984). But, by the 1980s, when microcomputers really took off, almost every area of society from schools to government to businesses began to purchase them. In addition millions of families purchased them for home use. In terms of the use of computers in the newsroom, the acquisition followed several stages. First, individual reporters bought their own computers. Later organizations purchased them. Initially microcomputers were primarily used for word processing instead of typewriters. But newspapers gradually began to supply computers for their reporters. One of the earliest purposes was to connect to online databases that aided the development of stories.

By the 1980s, newsrooms began to rely on databases in several ways. First, newsrooms began to store old clips in computer libraries. Then they used commercial databases for background information in their stories. Also, some newsrooms developed databases for specific topics. In addition, newsrooms used computers to analyze government records. In the middle of the 1980s, computers were being used in many places to assist in investigative reporting. One major advance came from Elliot Jaspin at *The Providence (RI) Journal* (Jaspin, personal communication, November 22, 1999). Jaspin noticed that in the course of six months, three children were killed when they alighted from school busses and the busses ran over them. To investigate the background of these bus drivers, Jaspin took a database of school bus drivers and found matches with a database of traffic violations. He also matched the bus drivers with court records and found bus drivers who were drug dealers. As a result of his story the state revamped the licensing procedures for school bus drivers.

Jaspin used computers for another story in the 1980s. Still writing for the *Providence Journal*, Jaspin used a computer tape from the Rhode Island Housing and Mortgage Finance Corporation to analyze records of 35,000 mortgages supposed to help low- and middle-income buyers buy low-interest mortgages. Jaspin's analysis revealed that the lowest interest rates and the largest loans had been granted to the children of high-ranking state officials (Jaspin, 1985). The article led to 25 indictments.

A review of CAR stories in the 1980s would not be complete without mentioning Bill Dedman's Pulitzer Prize efforts at the *Atlanta Journal and Constitution*. In 1989 he produced a series of stories, "The Color of Money" which revealed racist policies in lending of Atlanta-area financial institutions

Another advance in computer-assisted reporting occurred in 1989 with the founding of the National Institute for Computer-Assisted Reporting formed by the organization of Investigative Reporters and Editors in conjunction with the University of Missouri School of Journalism and originally called the Missouri Institute for Computer-Assisted Reporting. Its objective was to train journalists "in the practical skills of finding, prying loose, and analyzing electronic information" (Anonymous, 1999, November 15, National Institute for Computer-Assisted Reporting, <http://www.nicar.org>).

By the early 1990s, stories created by using computers were too numerous to outline. But what did computer-assisted reporting involve? By then, a plethora of methodologies had developed in which computers were employed. Houston (1996) presents some modern techniques of computer-assisted reporting. He identifies three "basic tools for computer-assisted reporting" (Houston, 1996, p. 6). These are spreadsheets, database managers, and on-line resources. Spreadsheets are used to analyze numbers whereas database managers are useful for organizing sources. On-line resources, Houston (1996) explains, include electronic mail, discussion groups, database libraries and bulletin boards. Other tools such as statistical software and mapping software were also in common use at this time.

According to Meyer (1991), the developments in computer-assistance for reporting have come to redefine the field up to the point that journalism is now scientific. This modern use of computers in the newsroom is what Meyer identifies as precision journalism. Meyer (1991) identifies several characteristics of precision journalism. One component of modern computing in the newsroom is the use of higher-level programs that are useful in the analysis of statistics. These two packages are SPSS (Statistical Package for the Social Sciences) and SAS (Statistical Analysis System). These programs are an added dimension of a development that emerged in the 1950s with Hopper's computer languages. Compilers were another dimension. They enabled users to employ Hopper's computer languages on different machines. SPSS and SAS were higher-level special purpose programs that "let the user invoke them in a way that is almost like talking to the computer in plain English" (Meyer, 1991, p. 83).

SPSS and SAS are similar systems but have some important distinctions worthy of examination. As Meyer (1991) explains, SAS is better oriented for the programmer while SPSS is more useful to the nonprogrammer. SAS is a more flexible system, but making labels and setting up tables is easier in SPSS where cross tabulation was also easier. On the other hand, SAS is more useful for file management. SAS's weakness lies in its manuals, which were directed to an audience of programmers when they were written in the 1980s. One good thing about both of these systems is that they can both handle complicated files such as the hierarchical ones that are included in the category of nonrectangular files. Nonrectangular files are those in which there is a different number of variables as the number of records.

Meyer (1991) identifies another aspect of precision journalism, and that is the use of surveys for public opinion polling. An important element of sampling is that "each member of the population to which you wish to generalize must have a known chance of being included in the sample" (Meyer,

1991). Another element of precision journalism specifically and for computer-assisted reporting in general includes conducting field experiments.

### **Forces driving CAR**

After having examined how computers entered the newsroom, from primitive devices to the modern equipment we have now, questions arise as to what extent computers are used today. How have particular newsrooms adopted instruments and techniques necessary for computer-assisted reporting? How can the movement to computer-assisted reporting be classified? The present hypothesis is that the introduction of computers into the newsroom was initiated by a few pioneers and has only now spread to a wider population of researchers. How have the pioneers contributed to the movement? The next portion of this paper will turn to a panel of experts, those individuals and newsrooms that have been instrumental in the development of computer-assisted reporting. The list includes such newspapers as the *Charlotte Observer*, *Detroit News*, *Pittsburgh Post-Gazette*, *San Jose Mercury News* and *Washington Post*.

According to Ted Mellnik, database editor for the *Charlotte Observer*, the first computerized publishing systems in which reporters wrote on terminals were in the 1970s (Mellnik, personal communication, November 16, 1999). But it wasn't until the mid-1980s that actual computers entered the *Observer* newsroom. At that time, all they had was mainframe computers. One of their first computer-assisted reported stories was in 1984 with an analysis of campaign contributions to the North Carolina general assembly. A group of reporters and editors built a database of campaign contributions and analyzed the data using the computer program. In 1985, PCs were introduced in the newsroom. One of the first applications was an analysis of election results in 1985. They analyzed the voting results patterns by county and by precinct.

By the late 1980s, more people had PCs in their newsroom and they started to use a spreadsheet called Symphony, which was a type of Lotus 123. "We used it for various statistics for various sorts of small-scale stories," Mellnick said (Mellnik, personal communication, November 16, 1999). One example of a story they used with the program was for an analysis of patterns of infant death rates across the state. By 1988, the newsroom acquired its first database program for the PC and did another project on campaign contributions for federal and state congressional races.

In 1990, the newsroom started using the software package SAS to analyze large data files. Further advances in technology followed soon after. In 1993 reporters started using computer mapping. In 1997 the newsroom began to use searchable databases on the Internet. A recent example of the use of computers to assist reporting came in the form of analyzing the new school zoning assignment. A federal judge had ordered that the schools stop school bussing for racial integration. As a result, the school board had to redraw all the school districts to prevent long bus rides. The newspaper used computer mapping software to publish a 12-page section that described and mapped the new districts. In the Sunday edition of the newspaper, it published a story that compared the population of the old district and of the new, an application that wouldn't have been possible without the computer mapping and statistical software.

Another example involves using the Internet. In February 1998, all local properties were evaluated for their current value. Homeowners received a written notice of the values of their house. The *Observer* created a searchable database on the Internet so that homeowners could look up the values of other houses on their street. By being able to compare values of other houses, homeowners were able to determine if their own value was fair. "That year the county reported that they had the fewest number of homeowners contesting their home value. We think it was because people had the

information to make a judgment as to whether the value was fair" (Mellnik, personal communication, November 16, 1999).

At first, not everyone in the newsroom was adept at using the new technology. During the early years only one or two people were familiar with using the databases. "In the mid 1990s we started getting six or eight PCs around the newsroom for reporters to use even though they weren't writing stories on them. We started doing classes for reporters in general to teach them how to use spreadsheets and e-mail and the internet," Mellnick said (Mellnik, personal communication, November 16, 1999). Now the *Observer* newsroom has a new publishing system that has provided new PCs on every reporter's and editor's desk. "Every reporter and editor has a machine with spreadsheet and database software" (Mellnik, personal communication, November 16, 1999).

The integration of computers in the newsroom for *The Washington Post* mirrored that of the *Charlotte Observer*, says Diane Weeks, deputy information technology editor for the *Post* (Weeks, personal communication, November 17, 1999). The first mainframes entered in the 1980s and were used for text editing. Now the newsroom has PCs and everyone has an Internet connection that he or she use to conduct research. Reporters also use Microsoft Excel, Access, and photographers are using computers to scan pictures. "We're doing the whole gamut" she said (Weeks, personal communication, November 17, 1999). Some of the newspaper's recent CAR investigations involved analyzing the D.C.'s police arrest and conviction record for an extended period of time. The newspaper also did another study on police officers' guns that had been retired and it found that the guns were finding their way back in the community. Another study involved examining the voting habits of the county board of supervisors which revealed that members of the board of supervisors was not voting the way they said they did.

At the *San Jose Mercury News* computers are also now in widespread use. The newsroom acquired PCs in 1995. Before that the newsroom used Coyote terminals, so-called "dumb" terminals that could only be used for writing stories on a mainframe. Jennifer LaFleur, former database editor for the *Mercury News* and now CAR editor at the *Saint Louis Post-Dispatch*, speculates that those terminals arrived in the early 1980s (LaFleur, personal communication, November 17, 1999). One example of how the newspaper has used computers was to analyze a database of grazing permits. The newspaper looked at the Bureau of Land Management and the National Forest Service's permits that allowed individuals to have animals graze on the land at a rate subsidized by the government. Ranchers lease the land and have permits to graze. The analysis discovered that "many of the people who have the largest amount of leasing permits are getting it at a lower rate than they would pay for private land. Many are rich individuals that probably don't need government subsidized land" (LaFleur, personal communication, November 17, 1999). In another example "one reporter wanted to see how zoos were getting rid of animals" (LaFleur, personal communication, November 17, 1999). That reporter acquired a database of every animal transaction in the world and was able to show that a large number of animals were given to hunting ranches where they were shot for sport. Other examples of CAR in use were for a study on arrest rates and for tracking cases of domestic violence. Like the *Charlotte Observer*, the *San Jose Mercury News* held training sessions on the new equipment for the reporters.

For *The Detroit News*, computers did not become widespread in the newsroom until the early 1980s, according to the newspaper's Cheryl Phillips (Phillips, personal communication, November 16, 1999). Recently the newspaper did a story analyzing the mortgage loan acceptance and denials by race to see if black people were being denied loans more than white people. Using database mapping software called *Arcview*, the newspaper developed a story showing that black people were being



denied loans more than whites. In another story, the paper used mapping software to map all the crime in the city of Detroit.

Phillips also highlights some of her CAR work at other newspapers. While at a small newspaper in Montana, she used mapping software to keep track of gang activity. She also used a relational database software called *Paradox* to analyze where people moving into the state were coming from. While at the *Fort Worth Star Telegram* Phillips used a spreadsheet to analyze financial information for a Texas Rangers base ball park.

Ken Zapenski, associate business editor for the *Pittsburgh Post-Gazette*, describes some of the latest advances in his newspaper (Zapenski, personal communication, November 17, 1999). "Primarily the biggest change has been web access information at your fingertips that you couldn't have gotten before or would have taken hours or days to track down." He also says that e-mail has brought many changes into the newsroom. Whereas before the introduction of this technology interviews had to be conducted by phone or in person, "now you can just exchange e-mails. It's easier to set up appointments."

Arizona State University Knight Professor Steve Doig used CAR techniques in his two-decade newspaper career at *The Miami Herald* (Doig, personal communication, November 15, 1999). In one instance, he did an analysis of damage caused by Hurricane Andrew. In another example he did a set of stories called "Crime and No Punishment," which investigated Dade's criminal justice system. He emphasizes that computers should be used in everyday reporting, not just for Pulitzer Prize winning reports.

Various newspapers across the country have integrated computers in the newsroom and have become adept at computer-assisted reporting. But how can the introduction of computers in the newsroom be characterized? Was it the case the CAR followed a pattern of gradual development or

was it a phenomenon that only came about with the efforts of a few pioneers? Was it technology that drove reporting or the reporting of those pioneers that drove technology?

It seems as though computer-assisted reporting started with a few individuals such as Meyer and Jaspin that only later spread to the greater community once CAR techniques became more available. Though DeFleur (DeFleur, personal communication, November 17, 1999) believes that "the introduction of computers in the newsroom--along with the innovations the resulted from that, such as computer-assisted reporting--would have spread to the journalism community regardless of who started these trends," she concedes that "the movement toward the application of computers and the use of statistics and scientific methods in newsrooms spread more rapidly because of those early pioneers." DeFleur explains that because the work of the early innovators was so dramatic it brought attention to these new methodologies that fueled their dispersion among the journalism community.

"[The movement toward CAR] was driven by a few individuals (Jaspin, personal communication, November 22, 1999). Jaspin emphasizes that it was people like Meyer who were the real pioneers in the movement toward CAR. "The CAR pioneers were those who discovered pretty much on their own that computers and social science techniques might help them do their jobs as journalists better," (Doig, personal communication, November 15, 1999). Doig emphasizes that though CAR techniques might have begun with a few pioneering individuals, they quickly spread to the greater population of journalists when (sometimes prize-winning) results of the pioneers came to be known.

Now that CAR techniques have become more widespread, "there has been a shift...There was a period when it was a few individuals in the newsroom with those interested in investigative reporting, not necessarily a background in reporting. We wanted to get the story and it became increasingly necessary to look at public records that were computerized," explains Bill Dedman in describing the spread of CAR (Dedman, personal communication, November 15, 1999).

In investigating how computer-assisted reporting spread, it is important to note that it would not have come about unless the solid background of reporting skills was already in place. As Meyer explains, "the reporting preceded the technology. If there had been no computers available for the Detroit riot survey, I would have used a punched-card sorter" (Meyer, personal communication, November 16, 1999) Doig is in agreement with Meyer. "It is very much a movement from the bottom up, by individual reporters who learn these techniques because they think it will make them better" (Doig, personal communication, November 15, 1999)

Though new advances in computing have evolved, they haven't completely eliminated underlying reporting skills, which are still necessary to put together a good story. The movement toward computer-assisted reporting was reporter driven-- technology is no good unless it is applied, explains Houston (Houston, personal communication, November 15, 1999). Mellnik echoes this understanding (Mellnik, personal communication, November 16, 1999). He says that the spread of CAR was driven by reporters. "Technology on its own doesn't do anything. You have to have a story idea and skills and the interest in order for the technology to be mobilized...It's reporters and stories that drive computer-assisted reporting."

## **Discussion**

Computing has come a long way since the primitive abacus used by our early ancestors. As technology developed, journalists started taking advantage of new ways to employ it first with the 1952 presidential election and CBS's use of the Remington Rand UNIVAC. Following this case, the introduction of computers into the newsroom became more widespread until the 1980s when microcomputers became commonplace.

Computer-assisted reporting was a phenomenon initiated by a few individuals who brought new techniques into the limelight. These individuals included pioneers Philip Meyer, with his Detroit riot analysis and, Elliot Jaspin, with his study of school bus drivers. Soon after came further investigations by Clarence Jones, David Burnham, Rich Morin, Fred Tasker, Don Bartlett, and James Steele. It was only once these techniques became available to the wider population of journalists that technology was able to spread into what Meyer (1991) calls precision journalism.

For CAR to have found so much success entailed that the journalism skills any competent reporter must have already be in place. The growth of commuter-assisted reporting was able to be a useful phenomenon only because the basic journalistic abilities already existed. Journalists were able to exploit the technology only because it built upon their already existing abilities. The development of computer-assisted reporting has been a reporter-driven event. As helpful as technology is, it is only as good as the reporter who is behind it.

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