CHARLES BABBAGE INSTITUTE

# NEWSLETTER

Vol. 22 No. 1
Fall 1999

CENTER FOR THE HISTORY OF INFORMATION PROCESSING

**Production of the CBI *Newsletter* is supported by the Charles Babbage Foundation**

# CBI Software History Program

The Charles Babbage Institute has developed a Software History Program to expand interest, understanding, and resources in the historical study of software. The program consists of three primary components: a software history project, education/research, and archival activity. The software history project is being funded by a three-year National Science Foundation grant awarded to CBI at the beginning of September. A summary of the structure of this project is contained elsewhere in this *Newsletter* (see "CBI Awarded NSF Grant for Software History Project").

Independent of this project, the Institute has organized an education and research initiative in the history of software. Currently planned as part of this initiative are two conferences on the history of software. In April 2000 the Institute will co-sponsor an international conference on common issues of software development, entitled, "ICHC 2000: Mapping the History of Computing - Software Issues." The conference will concentrate on determining a research agenda for the field. The principal sponsor of this conference is the Heinz Nixdorf MuseumsForum, Paderborn, Germany. (See p. 7 for program).

In Fall 2000 CBI will sponsor a conference on the software industry that will focus on the theme of the "Emergence of the Software Product." The

*Continued on page 3*

# CBI Awarded NSF Grant for Software History Project

The Charles Babbage Institute was awarded a three-year $488,000 NSF grant (September 1999 to August 2002) to develop, organize and disseminate resources and knowledge on the history of software. This project, entitled, "Building a Future for Software History," will be a part of the Institute's larger Software History Program. The project will consist of four components: organizing a knowledge network of individuals in the software community, creating a web-based historical dictionary of software, conducting an oral history initiative to interview pioneering software developers, and publishing an online journal of software history. These components will work synergistically to expand understanding and scholarship in this neglected area of study.

The principal investigators (Robert W. Seidel, Jeffrey R. Yost, Elisabeth Kaplan, and Arthur L. Norberg) will begin by organizing a knowledge network that will facilitate and grow with the other three initiatives of the project. The network will consist of eight to ten committees, each focused on a different area of software development. These committees will be staffed by the four principal investigators and a post-doctoral fellow, all of whom will

*Continued on page 3*

# Lynn Leitte is New CBI Assistant Archivist

Lynn Leitte began work as assistant archivist at CBI in October 1999. Lynn came to CBI from the processing department in the Division of Library and Archives at the Minnesota Historical Society (MHS). At MHS, Lynn processed and cataloged a variety of kinds of archival materials including manuscript collections, and corporate and government records. MHS has been a pioneering institution in the development and implementation of Encoded Archival Description (EAD). EAD is the international standard format for archival finding aids that uses new markup languages (SGML and soon, XML) to provide a stable structure for finding aids and to enhance web-based searching. While at MHS, Lynn participated in the testing of the application of EAD to MHS's finding aids.

In 1996, Lynn was an intern at CBI

*Continued on page 11*

# Recent Publications

Aspray, William. "Command and Control, Documentation, and Library Science" *IEEE Annals of the History of Computing* 21:4 (October-December 1999) 4-20.

Bowden, Mary Ellen, Trudi Bellardo, and Robert Virgil Williams, eds. *Conference on the History and Heritage of Science Information Systems* (Medford, NJ: Information Today, 1999).

Brooks, Rodney Allen. *Cambrian Intelligence: The Early History of the New AI* (Cambridge: MIT Press, 1999).

Buck, George H. "W. Stanley Jevons, Allan Marquand, and the Origin of Digital Computing" *IEEE Annals of the History of Computing* 21:4 (October-December 1999) 21-27.

Curry, Michael R. *Digital Places: Living with Geographical Information Technologies* (London: Routeledge, 1998).

De Marco, Giuseppe, Giovanni Mainetto, Serena Pisani and Pasquale Savino. "The Early Computers of Italy" *IEEE Annals of the History of Computing* 21:4 (October-December 1999) 28-36.

Gass, Saul I. "Project Mercury's Man-in-Space Real-Time Computer System" *IEEE Annals of the History of Computing* 21:4 (October-December 1999) 37-48.

Gatlin, Jonathon. *Bill Gates: The Path to the Future* (New York: Avon Books, 1999).

Gurak, Laura J. *Persuasion and Privacy in Cyberspace: The Online Protests Over Lotus Marketplace and the Clipper Chip* (New Haven: Yale University Press, 1997).

Harris, James R. "The Earliest Solid-State Digital Computers" *IEEE Annals of the History of Computing* 21:4 (October-December 1999) 49-54.

Joyce, Michael. *Othermindedness: The Emergence of Network Culture* (Ann Arbor: University of Michigan Press, 1999).

Kurzweil, Raymond. *The Age of Spiritual Machines* (London: Phoenix, 1999).

Lewis, Michael M. *The New New Thing: A Silicon Valley Story* (New York: W. W. Norton, 1999).

Newborn, Monroe. *Kasparov Versus Deep Blue: Computer Chess Comes of Age* (New York: Springer, 1997).

Purdy, J. *ThinkPad: A Different Shade of Blue: How IBM Created the Most Successful Computer Brand in History* (Indianapolis: Prentice Hall, 1999).

Randall, Neil. *The Soul of the Internet: Net Gods, Netizens, and the Wiring of the World* (London: International Thomson Computer Press, 1997).

Read, Stuart. *The Oracle Edge: How Oracle Corporation's Take No Prisoners Strategy Has Created a $8 Billion Software Juggernaut* (Holbrook, MA: Adams Media, 1999).

Rochlin, Gene I. *Trapped in the Net: The Unanticipated Consequences of Computerization* (Princeton: Princeton University Press, 1997).

Rutland, David. "The SWAC: First Computer on the West Coast" *Analytical Engine* 4:1 (Winter 1997) 31-34.

Tsang, Cheryl D. *Microsoft First Generation: The Success Secrets of the Visionaries Who Launched a Technology Empire* (New York: Wiley, 1999).

Tseng, Shawn and B. J. Fogg. "Credibility and Computing Technology" *Association of Computing Machinery, Communications of the ACM* 42:5 (May 1999) 39-44.

Turkle, Sherry. "Computational Technologies and Images of the Self" *Social Research* 64 (Fall 1997) 1093-1111.

□

**CHARLES BABBAGE INSTITUTE**

**NEWSLETTER**

The Charles Babbage Institute for the History of Information Processing is sponsored by the University of Minnesota and the information processing community.

*Charles Babbage Institute Newsletter* is a publication of the Charles Babbage Institute, University of Minnesota, 103 Walter Library, 117 Pleasant Street S. E., Minneapolis, MN 55455 USA. The Newsletter reports on Institute activities and other developments in the history of information processing.


**CBI staff may be reached by**

e-mail: cbi@tc.umn.edu

Telephone: (612) 624-5050

Fax: (612) 625-8054

WWW Site:

http://www.cbi.umn.edu

# Collections Available for Research

Since last reported in the *Newsletter*, many collections in the CBI archives have been processed in part or full. Among these are: the Academic Computing Collection, ca. 1950-1985; Charles W. Bachman Papers, 1951-1996; James W. Birkenstock Collection of IBM Records and BTM Histories, ca. 1950-1958; Conference on Data Systems Languages Records, 1959-1987; Data Processing Management Association Records, 1950-1989; Erwin Tomash, Collector, Dataproducts Corporation Records, 1962-1982; Information Processing Glossaries Collection, 1953-1991; and U.S. Government Computing Collection, ca. 1945-1983.

Continued generous donations from individuals and organizations have expanded the following collections: Market and Product Reports Collection, 1963-ongoing; Computer Product Manuals Collection, ca. 1948-ongoing; and Computer Product Literature Collection, 1948-ongoing.

In the future, the CBI *Newsletter* will report regularly on newly accessioned and processed collections at the CBI archives.

□

*Moving?*
*Don't forget to send your change of address to CBI, 103 Walter Library, University of Minnesota, Minneapolis, MN 55455*

# SHOT Annual Meeting

The 1999 Society for the History of Technology (SHOT) Conference was held in Detroit from October 7th to 10th. An opening night plenary session on "Writing the History of Technology" focused on exploring methodologies for expanding audiences of scholarly works in the field beyond academe. The value of trying to recreate virtuoso studies in the field, the use of discourse analysis, and the need for macro history to complement the detailed analysis of the many valuable case studies in the existing literature were the focus of the speakers and the discussion that followed. The next three days were filled with two dozen sessions on a wide variety of technologies and themes, including two on the history of information processing.

On Friday morning Arthur L. Norberg chaired a session entitled "Computers Rule: Cybernetics, Networks and Political Calculations." The first presenter, Slava Gerovitch of Massachusetts Institute of Technology, gave a paper on the design and adoption of digital computers in the Soviet Union during the early 1950s amid the anti-cybernetics campaign. Gerovitch argued that the anti-cybernetics ideologues opposed human/machine analogies, but did not attack or hinder digital computer development in the Soviet Union. Instead, inter-institutional rivalries led to the withholding of critical components between government agencies, and constrained Soviet digital computing technology at this time.

Gerovitch's talk was followed by a presentation on internet culture in Estonia by Janet Abbate of the University of Maryland, the author of the recently published *Inventing the Internet* (M.I.T. Press). Abbate's talk focused on how the government and people of Estonia have rapidly embraced internet technology in the 1990s. She explored the cultural significance of the frequently visited government internet stations and cyber cafes that litter the Estonia countryside.

*Continued on page 10*

# CBI's NSF Software Project

*Continued from page 1*

work in close consultation with Trustees of the Charles Babbage Foundation to build connections with individuals throughout the software community.

The knowledge network will enhance the effectiveness of collecting data on software development and will be fundamental to the creation of an online historical dictionary of software. By the end of the grant period, the searchable web-based dictionary will consist of approximately 1,200 entries and will provide historical definitions, technical descriptions, illustrations, and bibliographical information on software technology during the mainframe and mini-computing eras. The dictionary will also include entries on the principal individual and institutional actors involved in this history.

Prior to inclusion on the CBI software history web site, drafts of entries written by committee members or by the project staff at CBI will be synthesized and validated by the principal investigators. Once mounted to the web site, hyperlinks will allow easy access to related entries, and the resulting hierarchical structure will further the understanding of software history.

Complementing the Charles Babbage Institute's existing Software Oral History Program will be the project's initiative to interview leading software developers. The organization of the knowledge network and research conducted for the historical dictionary will aid in the identification of individuals and themes to be targeted. Thirty-two interviews will be conducted and abstracts will be placed on the Institute's software history web site.

The final component of the project will be the creation of an online journal of software history to encourage and distribute historical analysis of software. This refereed journal will publish articles on a continuous basis, allowing authors to avoid lengthy waiting periods, and giving readers free access to the most recent scholarship in the field. The journal will be edited by the Charles Babbage Institute. Like the historical dictionary and oral history abstracts, the journal will be placed on the CBI software history web site.

The Charles Babbage Institute plans to continue the web-based historical dictionary, oral history initiative, and journal after the three-year NSF grant. The principal investigators believe that the momentum, proven track record, and connections made will enable the Charles Babbage Foundation to succeed in its goal of raising the necessary funds for the continued operation of these valuable resources for the development and distribution of knowledge.

*Jeffrey R. Yost* □

# CBI Software Program

*Continued from page 1*

conference will explore: the transition to developing software as a product prior to IBM's 1969 unbundling decision, the unbundling at IBM and other firms, and the subsequent growth of the software industry. Further details on the conference will appear in the Winter 2000 CBI *Newsletter*.

The final component of the Software History Program will be an ongoing effort by the CBI archives to identify, preserve, and facilitate access to records in the history of software and to serve as a clearinghouse for information pertaining to software history. This will include collecting relevant archival materials at the CBI archives; locating and sharing information about complementary collections at other repositories; conducting oral histories with key participants in software development; initiating collaborative efforts with archivists, historians, software developers, members of the information technology community, and others to articulate concerns and disseminate information relating to the records of software history.

□

# The Emergence of Popular Descriptions of

*Editors Note: The author of this article, Patricia Hemmis, served as the Acting Archivist at CBI from September 1998 to September 1999. She is a past recipient of the Erwin and Adelle Tomash Fellowship. This article is based upon research from her dissertation, which she is now completing for the Department of Design, Housing, and Apparel at the University of Minnesota.*

The first public presentation of an electronic computer took place in 1946. In 1950 electronic computing consisted of a few specially designed machines. By 1955, there were approximately 1,000 general-purpose computers, and in 1960, 5,000 computers were operating in the United States. Less than two decades after its introduction, the electronic computer had accrued such powerful connotations that Americans were said to be living "in the Computer Age."

The "Computer Age," however, differed fundamentally from other postwar characterizations such as the "Age of the Automobile" or the "Television Age." Americans were buying and driving cars; they were reorganizing their living rooms and changing their eating habits to integrate television into their lives. Cars and TVs entered everyday life in a tangible and visceral way—through use and experience.

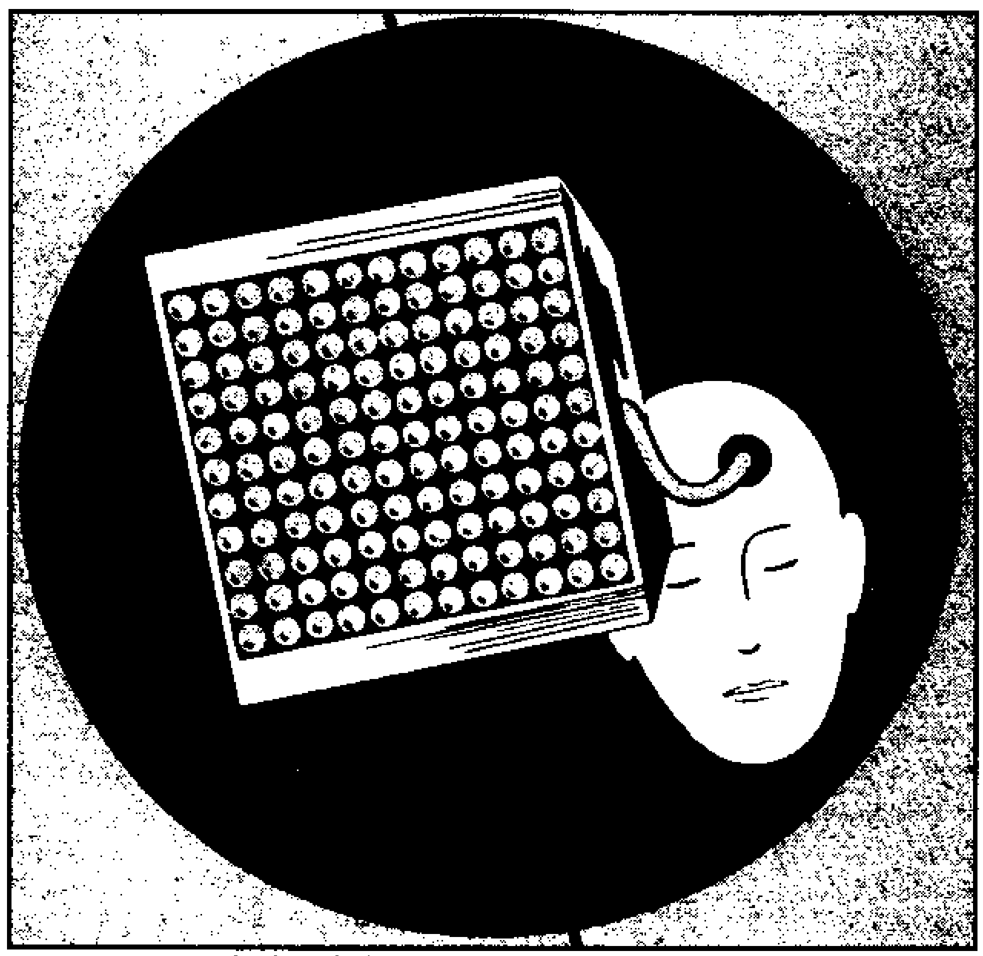


*Figure 1: Detail of Berkeley's Giant Brains, or, Machines That Think*

On the other hand, the term "Computer Age" corresponded to a different type of interaction between humans and machines. Even as electronic computers slowly became fixtures in the work place, most postwar Americans were not actively engaged in using computers. Nonetheless, from the introduction of the first electronic computer, Americans were very much involved with and affected by descriptions of the electronic computer. Between 1946 and the mid-1960s, a stream of descriptive information concerning the electronic computer appeared in the public domain.

The importance of popular descriptions of the early electronic computer is largely overlooked in the history of computing as well as in cultural and design histories of the American postwar period. (Here the term description refers to both verbal and visual information).

Popular descriptions of computers were important because they provided a forum where a variety of ideas about the computer were articulated. Such descriptions had a common function. They were not representations of the computer, per se. What one was offered in the myriad descriptions of the electronic computer were representations of *thinking about* an electronic computer.

Popular descriptions were important means of *envisioning* the first electronic computers. This term has two useful qualities. First, envisioning contains the notion of "picturing in the mind." Second, envisioning has a predictive quality—of picturing in the mind a future occurrence—a simulation of possibilities. Descriptions that envisioned the computer allowed Americans to simulate and consider the ramifications of this new technology even though most had no direct contact with it.

Descriptions of early electronic computers were ubiquitous. They emerged from such diverse media as film, theater, television, radio, newspapers, literature, art, politics, cartoons, dress, trade and world fairs, product literature, scientific, technical and popular journals, professional organizations, and through the machine itself. Descriptions took many forms: from novels to radio skits; from logos to illustrations; from poems to product literature.

Although the sources and forms describing the early electronic computer were many and varied, the content was not. By far the dominant conceptualization of the first electronic computers was that of a "Giant Brain"—a machine that thought. Connecting the computer to the human brain in this manner involved the use of metaphor, or the conceptualization of one thing, in part, in terms of something else.

The process of developing a metaphor began by creating an analogy that stated that the computer *is like* a Giant Brain. Through use, however, the analogy was dropped and the computer became conceptualized *as* a Giant Brain. Common features between computer and brain were emphasized and relationships

# Early Electronic Computers in the U.S.

between the computer and other conceptualizations were de-emphasized.

Anthropomorphizing the computer into a Giant Brain and casting its processes as "thinking" served to raise questions concerning the most fundamental nature of this new technology. In effect, linking the computer to a brain inverted the long-held belief that the mind is a machine by turning the machine into a mind. And, by expressing its processes as thinking, the electronic computer was, in fact, being described as an entity—a living being.

Descriptions of the Giant Brain metaphor ranged from simple to highly sophisticated. Sometimes, just a simple identification of the components of the metaphor was the sum of the representation. One of the earliest and certainly the most literal example of the linkage between computers and the human brain illustrated Edmund Berkeley's *Giant Brains, or, Machines That Think*, published in 1949.

Berkeley's cover contains one of the most direct, unambiguous visual presentations of the Giant Brain metaphor. (Figure 1) This illustration shows an array panel, representing the computer, literally linked to the human brain via a cable that passes through or plugs into a large hole in the forehead of the man. The computer and the human brain are inextricably linked. Such literal descriptive examples are rare, and in this particular case, one must consider the ability of the illustrator to portray a more complex interpretation that would include the implications of the metaphor.

In the hands of a more adept illustrator the implications of the metaphor, rather than the specifics required to cast the metaphor could be articulated. The illustration shown here is of the Harvard Mark III magnetic drum calculator by illustrator Boris Artzybasheff. (Figure 2)


*Figure 2: Illustration, Boris Artzybasheff, 1949*

Artzybasheff was a prominent illustrator during the 1940s and 50s, a golden age of illustration. He created over 200 covers for *TIME* magazine between the late 1940s and the mid-1960s. He was well known for his illustrations of mechanical apparatus. His approach was one of anthropomorphizing the machine. In his handling of the Mark III, Artzybasheff goes to great pains to blur the distinction between man and machine. He portrays the Mark III as a machine capable of self-monitoring and self-adjusting. It discharges its duties unattended. Action is conveyed through humanized aspects of the computer—the eyeball scanning the printout, or the finger in the process of keying-in new information. Light comes mysteriously from within, but does not emanate from any buttons on the front of the machine. All the tape drives seem set to the same spot. Activity is conveyed solely through the eye and the two arms—the human portions. The illustrator wants the viewer to understand that this Giant Brain thinks and it thinks big. Military sponsorship is fully acknowledged by the cap resting at the center of the machine—a final touch, like the finial of a Philadelphia highboy. The sponsorship is reinforced by the rank displayed on the sleeves.

The cramped setting—the machine visually pushing against the ceiling as well as the sides of the room—serve to reinforce its stature as a giant, while conveying a power that is barely confinable. In Artzybasheff's capable hand, the Giant Brain is presented as a powerful living entity with equally powerful backers.

*Continued on page 8*

## Society of American Archivists Conference

The Society of American Archivists (SAA) held its annual conference in August in Pittsburgh. As usual, many of the conference offerings were pertinent to the concerns of the CBI archives.

SAA always devotes a significant number of sessions to electronic records issues, both theoretical and practical. The CBI archives, like many others, actively gathers information and seeks models for the appraisal and preservation of records that originate in digital formats. Archivists, in collaboration with other specialists, have made interesting and sometimes successful forays into this field; there is much to be learned at presentations on these works in progress.

At one particularly notable session, presenters described the multi-year collaboration between the National Archives and researchers at Georgia Tech and at the Supercomputing Center at the University of California San Diego; together, the partners applied high performance computing to support long term preservation and access to large volumes of software dependant electronic records, paying specific attention to the challenges presented by email. A very informative web site describes the collaboration, its goals, products, and other related initiatives. http://www.sdsc.edu/NARA/Publications.html

Business records comprise an important component of CBI's archival holdings. The line between contemporary business records and those that have become historically valuable is a sensitive one, and carries with it concerns about copyright, ownership, and restrictions. Equally important is the negotiation between the archives and the corporation for resources to house, process, and provide access to the records. One notable conference session demonstrated some useful strategies for dealing with these issues. Speakers included the archivist and an attorney from the Ford Motor Company, and a curator from the Henry Ford Museum. In 1964, Ford donated the bulk of its

*Continued on page 10*

# HSS Celebrates 75th in Pittsburgh

The History of Science Society held its 1999 Annual Meeting (on its Semisequicentennial Anniversary) in Pittsburgh from November 3-7, 1999. More than fifty sessions were held on a broad range of topics in the history, sociology, and philosophy of science.

On Saturday afternoon, current and former staff of CBI gave a session on the Institute's NSF Project, the "Computer as a Scientific Instrument," demonstrating the substantial and varied impact of computers on different scientific fields in the post-World War II era.

Chairing the session, CBI Associate Director Jeffrey Yost took the opportunity to discuss briefly his work in compiling an annotated bibliographic guide to primary and secondary resources on scientific computing between 1945 and 1975. This work will be completed and published either as a book or electronically on the CBI web site in the coming year.

The first presenter, Stephen Johnson of the University of North Dakota, gave a talk entitled, "Computers and the Practice of Psychology." Johnson discussed how computers performed critical functions in transforming the prevailing behaviorist psychology in the 1950s. He described how computer software provided an alternative to mathematical models in specifying theories of human behavior.

This was followed by Radford University Biologist Joel Hagen's presentation, "Computers as Scientific Instruments in Structural and Evolutionary Biochemistry." Hagen focused on the work of

*Continued on page 10*

# Trustees of the Charles Babbage Foundation

# *ICHC 2000: Mapping the History of Computing-Software Issues*

## *Conference Program*

A major international conference will be held in Paderborn, Germany, next year entitled, "ICHC 2000: Mapping the History of Computing-Software Issues." The Conference, to be held April 5-7, 2000, is being sponsored by the Heinz Nixdorf MuseumsForum and co-sponsored by the Charles Babbage Institute.

The Conference is an attempt to define a research agenda for the history of software, which, when pursued, will provide deeper insight into the nature, history, and influence of software in the latter half of the twentieth century. The conference schedule follows:

**April 5, 2000**

Welcome: Norbert Ryska (HNF)

Themes and Objectives: Arthur L. Norberg (Charles Babbage Institute)

Pioneers Talk: Friedrich L. Bauer (Technical University Munich)

*Workshop 1: Software as Science*

Moderator: Gerard Alberts (University of Nijmegen)

Speaker: Michael S. Mahoney (Princeton University)

Commentator 1: David Edge (Edinburgh)

Commentator 2: Gerhard Goos (TU Karlsruhe)

**April 6, 2000**

*Workshop 2: Software as Engineering*

Moderator: Wilhelm Schafer (University of Paderborn)

Speaker: James E. Tomayko (Carnegie Mellon University)

Commentator 1: Albert Endres (TU, Munich)

Commentator 2: Bruce Seely (Michigan Tech)

*Workshop 3: Software as Reliable Artefact*

Moderator: Wolfgang Coy (Humboldt University Berlin)

Speaker: Donald MacKenzie (University of Edinburgh)

Commentator 1: Bernd Mahr (TU Berlin)

Commentator 2: Victoria Stavridou (SRI, Menlo Park)

*Museums and Exhibitions Workshop*

Moderator: Ulf Hashagen (HNF)

Speaker 1: Doron Swade (Science Museum of London)

Commentator 1: Joachim Fischer (Kulturstiftung, Berlin)

Speaker 2: Ernst Denert (sd & m GmbH) / Klaus-Peter Lohr (FU Berlin)

Commentator 2: Prof. Friedrich L. Bauer (TU Munich)

Speaker 3: David Allison (NMAH)

Commentator 3: Hartmut Petzold (Deutsches Museum Munich)

Conference Dinner

**April 7, 2000**

*Workshop 4: Software as Labor Process*

Moderator: Reinhard Keil-Slawik (University of Paderborn)

Speaker: Michael Cusumano (MIT)

Commentator 1: David Hounshell (Carnegie-Mellon)

Commentator 2: Lucy Suchman (Xerox Palo Alto Research Center) or Susanna Boedker (Aarhus)

*Workshop 5: Software as Industry*

Moderator: Steve Russ (University of Warwick)

Speaker: Martin Campbell-Kelly (University of Warwick)

Commentator 1: Pierre Mounier-Kuhn (CNRS/Sorbonne)

Commentator 2: David Mowery (University of California, Berkeley)

Conference Organizing Committee:

William Aspray (CRA, Washington D. C., Martin Campbell-Kelly (University of Warwick), Ulf Hashagen (HNF Paderborn), Reinhard Keil-Slawik (HNI Paderborn), Michael S. Mahoney (Princeton University), and Arthur L. Norberg (Charles Babbage Institute). ☐

# Popular Descriptions...

*Continued from page 5*

This illustration appeared on a 1950 *TIME* magazine cover paired with a tagline that read, "Man creating a superman?" In 1952, with the tagline removed, the same illustration made an appearance as the cover of the technical publication: "Description of a Magnetic Drum Calculator."

Artzybasheff created several illustrations of Giant Brains between 1949 and 1966. His depictions of the Giant Brain contained certain common features. His machines were autonomous and entirely self-regulating—they successfully flipped their own switches, entered their own data. When humans were shown, they were depicted as mere attendants, doing the bidding of the machine. The features of Artzybasheff's Giant Brains were animated—they expressed emotion, from wariness, to concern, to smug superiority. The uniqueness and power of Artyzbasheff's work lies in the fact that he explicitly linked the computer to the human form and did so within his own longstanding illustrative tradition. As a result, the many viewers seeing Artzybasheff's *TIME* magazine covers, and advertisements in other high-profile journals of the period, came away with a strong prescription for the visualization of the computer as a Giant Brain.

Almost as soon as the Giant Brain metaphor appeared, it was short-handed. This metonymy, or the substitution of the part for the whole, occurred as salient features of the metaphor became familiar. These became meaningful in and of themselves. Metonyms associated with the Giant Brain metaphor were expressed visually, verbally, or in combination. Because of their frequency, such metonyms became familiar, expected, and easily understood. But even when these metonyms appeared over and over, in countless forms, their meanings could still be manipulated. Two powerful metonyms of the Giant Brain metaphor, the metonym of flashing lights and the metonym of quantification, will be discussed here.

The predominant metonymic component of the Giant Brain was that of flashing lights. These lights were present in the earliest popular descriptions of the electronic computer. In 1946, flashing lights played an important role in the first public presentation of the ENIAC. The use of flashing lights was neither a convention nor a conceit of those in charge of the ENIAC presentation. Engineers working to build the computer had recognized and appreciated the importance and necessity of the flashing lights of the machine at least two years prior, during the testing of the 2-accumulator model of the ENIAC. If the 2-accumulator model was a success, the final product could be built.

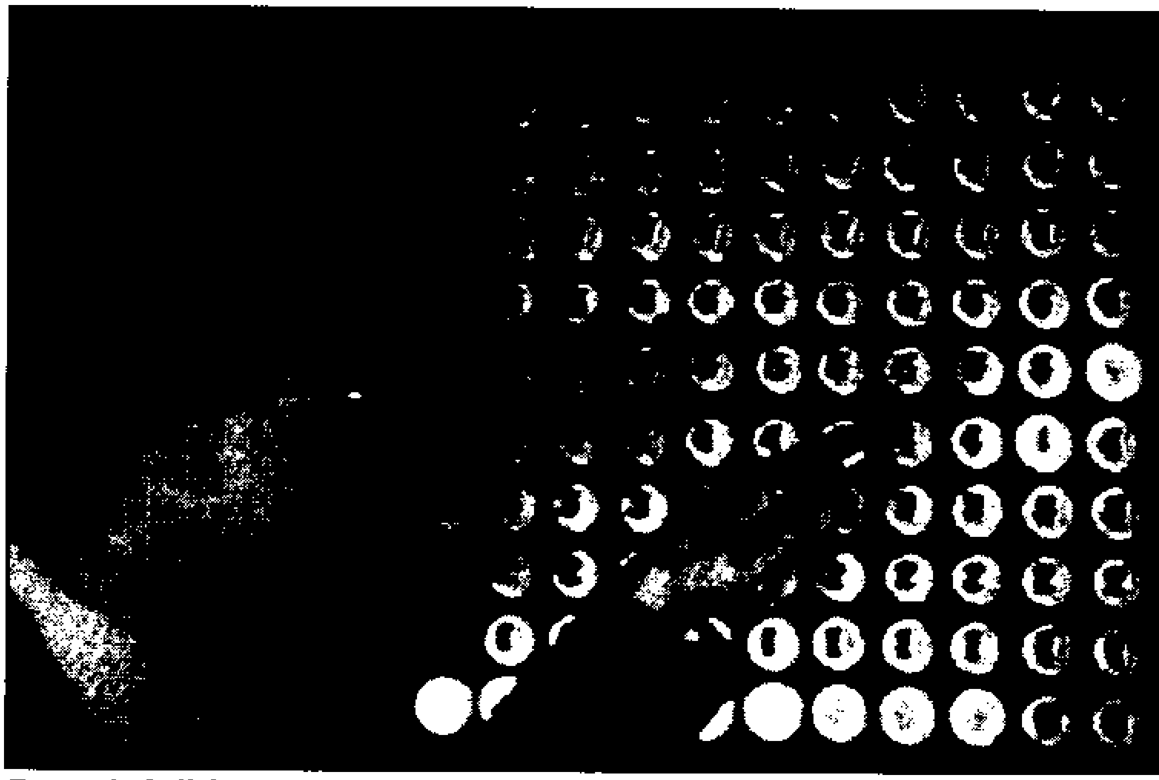


*Figure 3: Still from ENIAC Promotional Film, Army Ordnance, 1946*

J. Presper Eckert, one of the inventors of the ENIAC, provided insight into both the role and power of the flashing lights of the accumulator when he stated:

> Yes, you always (need) a convincer, and these first two panels, of course, with the neon bulbs on them and I think every science fiction movie since then has had little bulbs flashing all over the front of it...Once everybody saw all those bulbs flashing, everybody was convinced. (J. Presper Eckert interviewed by Christopher Evans, Philadelphia, 1975, CBI OH 193; Copyright, Science Museum of London).

The notion of a convincer is a crucial one. In the lab blinking lights provided a metonymic proof that the machine would work. The lights provided tangible, visual confirmation that the conceptual and theoretical components were sound. As such, they were very potent. Such cues also provided evidence when the machine was not working correctly. In this sense the flashing lights of the 2-accumulator tester, and later of the ENIAC itself functioned as a metonym of confirmation and therefore, reassurance. In public presentations of the ENIAC, however, the line between confirmation and "proof" was a fine one.

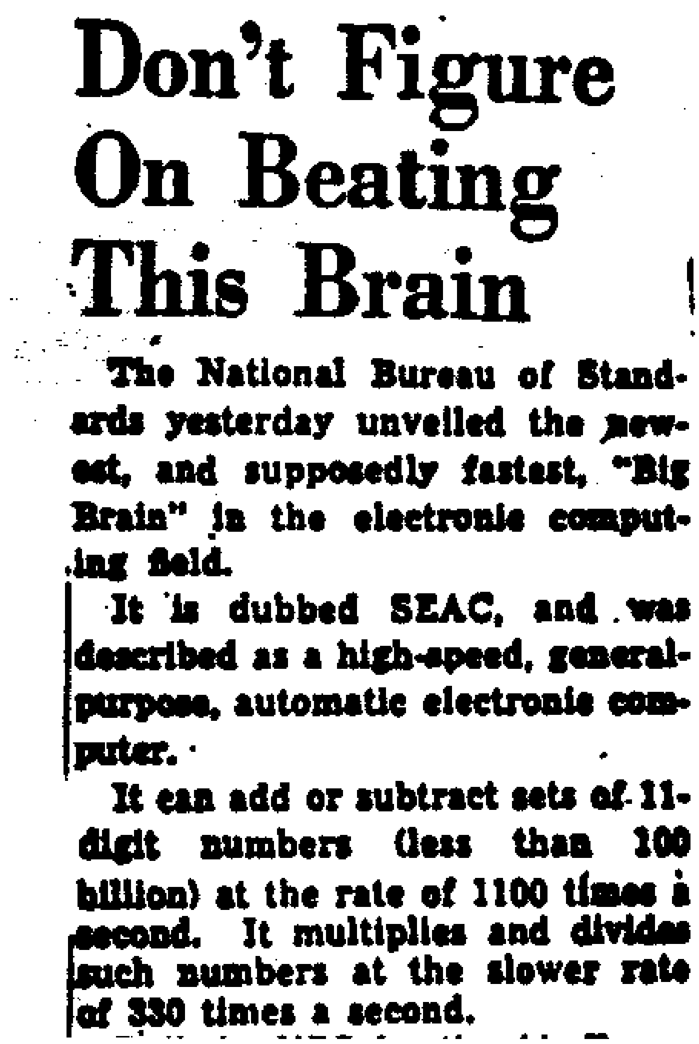
When it came time to present and display the ENIAC to the public, arrangements were made for the production of a MovieTone Newsreel. (Held in Sperry Rand Corporation, Honeywell versus Sperry Rand Litigation Records, CBI 72, Charles Babbage Institute). U. S. Army Ordnance provided the footage. The original lights on the ENIAC were red neon. The neon lights became problematic when photographers tried to shoot black and white newsreel footage of the computer. It was determined that some form of incandescent light was needed. The solution was ingenious in its simplicity. Incandescent bulbs were placed inside of numbered ping-pong balls that had been sawn in two.

The ENIAC team was working under severe time constraints in order to make a February debut. Yet, even if the ENIAC team privately questioned the necessity of the bulb substitution, time was allotted to complete the change to incandescent lights.

The newsreel footage shows the many ENIAC components, with male and female personnel setting up a program, inserting and removing punched cards, and conferring at different locations around the room. The highlight occurs when the numbered bulbs start to light up in rapid succession. (Figure 3) The original Army Ordnance footage was silent. In the newsreel, the voice-over takes pains to note that "the bulbs here are for demonstration purposes only."

As J. Presper Eckert noted, the association of flashing lights with the early electronic computer became de rigeur throughout the 1950s and 60s as various Giant Brains were presented to the public. What he failed to note, was that the substitution of fake computers, rigged with phony lights and tape drives also became de rigeur during this period.

For example, in 1952, a UNIVAC computer was used to predict the outcome of the presidential race between Eisenhower and Stevenson. The UNIVAC console at CBS Television headquarters used to predict the outcome was a fake, rigged with Christmas lights to give the appearance of machine activity while the real computer calculated a landslide Eisenhower victory at a remote location. Yet, for television viewers, the UNIVAC console with its blinking lights, messages, and whirling tape drives, conveyed the appearance of truth. This verisimilitude shaped popular ideas of what a computer looked like, and the astonishing things it could do. In this case, the metonyms of the specific machine components, reinforced by the events of the evening (where the computer predicted the election upset well before the majority of votes were in), provided a very public "proof" of the claims of the Giant Brain.



Don't Figure On Beating This Brain

The National Bureau of Standards yesterday unveiled the newest, and supposedly fastest, "Big Brain" in the electronic computing field.

It is dubbed SEAC, and was described as a high-speed, general-purpose, automatic electronic computer.

It can add or subtract sets of 11-digit numbers (less than 100 billion) at the rate of 1100 times a second. It multiplies and divides such numbers at the slower rate of 330 times a second.

*Figure 4: Clipping, Washington Post (June 20, 1950)*

In popular descriptions, the ENIAC and other early Giant Brains were invariably described in quantified terms. Between 1946 and the mid-1960s, the endless recitation of the number of parts, the enormity of the machine, and the inevitable comparison to human performance could be found nearly every time the electronic computer was described. What did this fascination with the numbers mean in terms of popular descriptions of early electronic computers as Giant Brains? And specifically, how did this fascination become metonymic in nature?

For over a decade, the content of Giant Brain descriptions containing quantified information remained relatively consistent. Changes to the content simply involved plugging-in the numerical data for the particular machine under discussion. Quantitative material appeared again and again until one began to recognize a certain cadence, a rhythm, to the material. (Figure 4) This repetition, coupled with the constancy of form and content, became a litany of quantification, and turned observations of the quantitative aspects of the early electronic computer into a metonymic feature of the Giant Brain description.

Such a litany of quantification described the ENIAC, the first electronic computer to be presented to the public. When the first public presentation of the ENIAC took place on February 14, 1946, quantitative data regarding the ENIAC was quoted in newspapers, magazine articles, and newsreel voice-overs. Visual evidence of quantitative data became the subject matter of photographs and newsreel footage. Boosterism of this new technology was justified by the numbers.

Themes presented in ENIAC's litany of quantification explored relationships among the physicality, speed and performance of the machine. Different groups saw these relationships differently. For example, in engineering circles, speed was the principal means of connoting its power. For this group, the physicality of the ENIAC was a by-product of the goal of creating a faster and hence, more powerful, machine. The enormous size was considered to be the result of specific intellectual and technological choices made during its development. Decisions reached during the designing and building of the ENIAC, such as the use of vacuum tubes to achieve greater speeds led to the choice to use decade counters and accumulators to contain the tubes. The end-result was an enormous machine. Insiders working

*Continued on page 11*

# SHOT...

*Continued from page 3*

The session commentator, Steve Usselman of Georgia Institute of Technology, pointed out that both of these important talks were inherently concerned with the pace of technological change, and thus, could benefit from greater comparative analysis.

The other session on information processing, "Clio and the Computer: Methodological Approaches to Artifacts, Actors, Systems, and Webs," took place on Sunday morning and was chaired by Robert W. Seidel. The first presenter, James E. Tomayko of Carnegie Mellon University (in a paper co-written with Rachel A. Knapp), examined the historiography of computers by quantitatively analyzing the production of articles in the field between 1964 and 1997 (as represented in *Technology and Culture* bibliographies).

Utilizing Paul Edwards' concept of an "internetwork" from a panel at last year's conference, Greg Downey of Johns Hopkins University followed with a presentation on how the telegraph, telephone, and post office "collide" to form an internetwork in the early twentieth century. Downey emphasized the importance of looking at an internetwork not only as a "thing," but also as a "process." He explored this through examining the labor and human geography of messenger boys in the early twentieth century to illustrate the coming together of the telegraph, telephone, and post office.

Like Downey, Paul Ceruzzi of the National Air and Space Museum presented a paper integrating the history and geography of technology. Ceruzzi examined the clustering of systems integration firms in Tysons Corner, Virginia, between 1960 and 1985. He demonstrated how the knowledge resources of former Defense Department employees, proximity to the Pentagon, and relatively cheap land led to the rapid growth of systems integration firms at this location.

Paul Edwards of the University of Michigan served as commentator, making connections between the latter two papers' analysis of geography. While praising the important research questions Tomayko made at the end of his talk, Edwards suggested that the physical classification categories (artifacts or hardware, and systems or software) Tomayko used might be less valuable than the functional distinctions of calculating, communication, and control.

Historians of information processing and other scholars with an interest in the field also came together for the Society's annual special interest group luncheon/meeting on computers. Approximately fifteen individuals attended to share information about their current research and events or developments of interest to the group. Arthur L. Norberg gave a brief summary on the programs, projects, and new personnel at the Charles Babbage Institute.

*Jeffrey R. Yost*

# SAA...

*Continued from page 6*

archives, along with all of the rights to those records, to the Henry Ford Museum. Participants discussed from a variety of perspectives the legal, historical, and records management implications of that transaction.

Oral histories also comprise an important part of CBI's collection. The panel discussion at SAA's Science, Technology, and Healthcare Roundtable provided a forum for a thought provoking discussion of the issues specific to the creation of oral histories of individuals in the fields of science and technology. The thorny matter of presenting these oral histories on the World Wide Web was addressed. Kevin Corbitt, former assistant archivist at CBI and present archivist at the Association of American Nurse Anesthetists commented on his experience at both institutions.

Current CBI archivist Elisabeth Kaplan presented a paper at a session which explored the challenge of postmodernism to the theoretical underpinnings of archives. Changing notions of truth and objectivity affect archives and archival work, and speakers discussed the need for archivists to face these dilemmas and described some strategies for doing so.

Bruce Bruemmer, former CBI archivist, served on the program committee. As well, he was named a Fellow, the highest honor awarded by SAA, which recognizes outstanding contributions to the archival profession and service to the Society.

*Elisabeth Kaplan*

# HSS...

*Continued from page 6*

mathematician and organic chemist Margaret Dayhoff in the early post-World War II period to explore the development of three important strands of bioinformatics: sequence analysis, creation of databases, and phylogenetic inference. Hagen's analysis called into question the rigid dichotomy between functional and evolutionary biology.

University of Minnesota Chemical Engineering Professor, and former CBI Director, Robert W. Seidel, then spoke on "High Energy Physics and High Speed Computing." He traced the introduction and use of computing for military applications from the mid-1940s through the 1950s, giving priority to Los Alomos National Laboratory, the first lab to bring together accelerators, theorists, and experimentalists.

Anne Fitzpatrick, a joint Post-Doctoral Fellow at George Washington University's Center for the Recent History of Science and Los Alamos National Laboratory, served as the commentator for the session. She pointed out how all three talks used contextual approaches, including biography, to better understand the developments and themes of computing and the sciences. She then went on to explore how the three presentations conveyed similarities and differences in the role of computing technology in transforming high-energy physics, cognitive psychology, and biochemistry.

*Continued on page 11*

# Leitte...

*Continued from page 1*

and processed archival materials including portions of the Burroughs Corporation collection; the papers of Charles W. Bachman, founder of Bachman Information Systems and early developer of relational databases; and a collection donated by Alex McKenzie documenting his and others' participation in the development of networking, including the International Packet Network Working Group and McKenzie's work at Bolt, Beranek, and Newman, Inc. She also processed the collection of Warren P. Burrell of Engineering Research Associates, who was involved in such projects as the ERA 1101, ERA 1103, the UNIVAC File Computer, and NIKE-X.

Lynn has also worked as an archival intern in the prints and photographs department at the Chicago Historical Society and as a research assistant at the Minneapolis Institute of Arts. She is current chair of the membership committee of the Midwest Archives Conference, and secretary of the Twin Cities Archives Roundtable. She has a Master of Arts in Art History, Theory, and Criticism from the School of the Art Institute of Chicago, and a Bachelor of Arts in Art History with a minor in Anthropology from the University of Minnesota, Morris.

With her previous experience with records relating to the history of information processing, her combination of archival skills, knowledge of current and emerging standards for archival description, and experience with materials in nontraditional formats, Lynn is already proving herself to be a wonderful asset to CBI's archival program.

*Elisabeth Kaplan* □

# HSS...

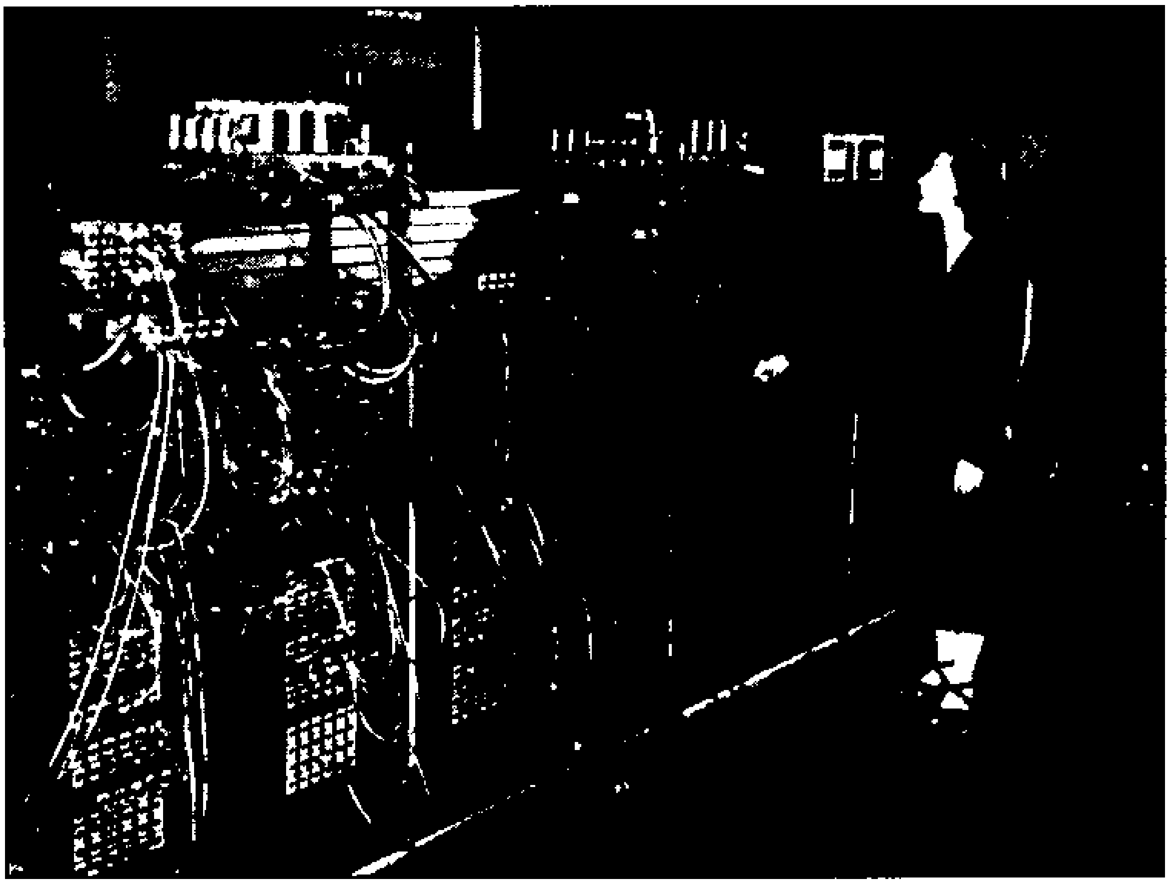
*Continued from page 12*

Among other issues, the discussion that followed this well-attended session explored whether or not computing represented a third method or type of scientific practice.

*Jeffrey R. Yost* □

# Popular Descriptions...

*Continued from page 11*



*ENIAC, 1946*

closely with the machine considered this a necessary evil rather than a desired outcome.

Alternatively, when the litany of quantification was presented in a popular venue great importance was placed on the physicality of the machine. Physicality included the attributes of measurement, weight, types, and number of parts. For example, the ENIAC's litany of quantification noted that: the computer required a room 30 feet by 50 feet; if stretched out side by side, its components measured 100 feet long, 10 feet high, and three feet deep, its 40 panels grouped into 30 units, and weighed 30 tons. The ENIAC contained 18,000 vacuum tubes of 16 different types, 70,000 resistors, 10,000 capacitors, and 6,000 switches.(Figure 5)

The constant emphasis on the Giant Brain's mammoth proportions served to reify the relationship between physicality and powerfulness. According to popular presentations of the litany of quantification, the ENIAC was considered powerful for specific, detailed, physical reasons. The proof seemed to lie in the authority of the numbers. The ENIAC was powerful because it was large and complex.

The litany of quantification served to establish a second crucial relationship: that between speed and power. This was important because speed and power were the arenas where the Giant Brain could be compared to other machines, other technologies, and most importantly, to human performance. Every litany of quantification included some mention of speed and power in relation to human performance. "It could do the work of 20,000 people working by hand." "What a person at a desk calculator could do in 20 hours, ENIAC could do in 30 seconds." Ignored was the fact that although the ENIAC could calculate in the blink of an eye, setting up the problem took hours of human/machine interaction.

Metaphoric conceptualizations of the early electronic computer as a Giant Brain resulted in a stream of popular descriptions in postwar America. Such descriptions were ubiquitous and effective. As Americans grappled with the notion of a machine that could "think," they had to articulate and examine fundamental relationships between humans and human-built technology.

*Patricia Hemmis*

(Images courtesy of the Charles Babbage Institute)

□

# Fifty Years Ago

1949 saw the publication of Edmund Berkeley's *Giant Brains, or, Machines That Think*, one of the first books on electronic computers intended for a general audience (see Patricia Hemmis's article in this issue for additional discussion of the characterization of computing machines as "Giant Brains").

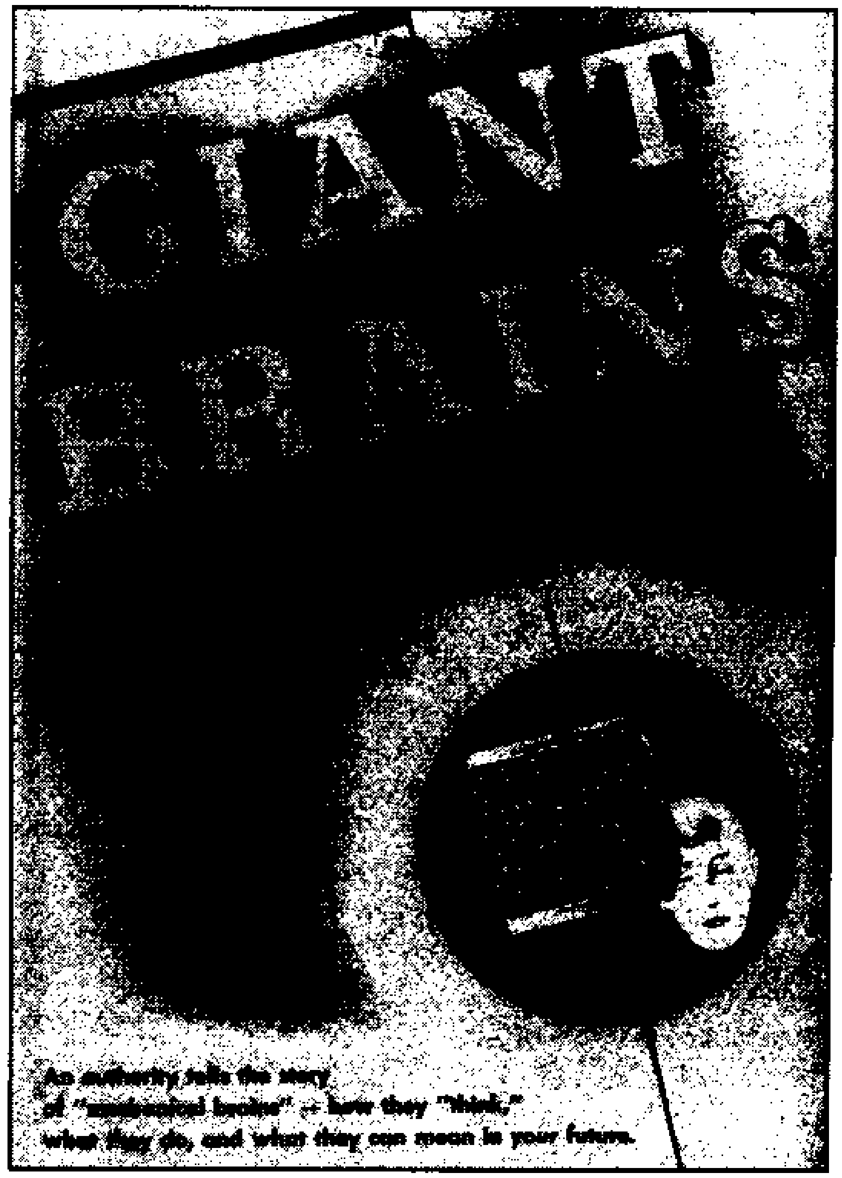
**30 years ago**

In 1969 IBM "unbundles" its software. Unbundling allowed customers to purchase hardware and software separately; this development gave tremendous momentum to what would become the multi-billion dollar software industry.

**10 years ago**

In 1989, the UCLA Computer Science Department hosted the ACT One (Advanced Computer Technologies One) symposium. The symposium addressed the history, current state of the art, and potential future developments of very high speed information networks, and commemorated the 20th anniversary of the ARPANET. Conference tapes, transcripts, and documentation are held in the CBI Archives.

*Elisabeth Kaplan and Lynn Leitte*




CHARLES BABBAGE INSTITUTE

**NEWSLETTER**

**Charles Babbage Institute**
University of Minnesota
103 Walter Library
117 Pleasant Street S. E.
Minneapolis, MN 55455, U.S.A.

Nonprofit Org.
U.S. Postage
**PAID**
Minneapolis, MN
Permit No. 155

Return Service Requested