

CHARLES BABBAGE INSTITUTE

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Special IEEE Annals of the History of Computing Issue Honoring Erwin and Adelle Tomash

By Jeffrey R. Yost

The *IEEE Annals of the History of Computing* has just published a special issue (Vol. 23 No. 4, October-December 2001) in honor of Erwin and Adelle Tomash, the founders of the Charles Babbage Institute and the Charles Babbage Foundation. The guest editor for the publication is William Aspray, Executive Director of Computing Research Association (CRA) and the former Associate Director of CBI. In addition to conceptualizing and editing the publication, Aspray provided a biographical article on Erwin Tomash. In turn, CBI Director Arthur Norberg contributed an article on Adelle Tomash. The two biographies highlight some of Erwin and Adelle's many insights and accomplishments, both inside and outside the computing field, not least of which is their important role in fostering scholarship and the preservation of resources in the history of information technology.



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Norberg's "A Perspective on the History of the Charles Babbage



Adelle and Erwin Tomash, circa 1990

Institute and the Charles Babbage Foundation," provides additional context to the vision and work of Erwin and Adelle, and, more broadly, discusses the principles and evolving research and archives programs of CBI, and the history of the Charles Babbage Foundation (an organization of corporate executives and academicians that serves in an advisory and financially supporting role to CBI). Norberg's article gives a thorough overview of CBI's historical research projects, products, and services, and briefly outlines collection development and the archives program, a topic addressed in greater depth in an article by former CBI Archivist Bruce Bruemmer (1984-1999) and current CBI Archivist Elisabeth Kaplan (1999 to present), "Realizing the Concept: A History of the CBI Archives."

Bruemmer and Kaplan each write about the CBI archives during their respective tenures at the Institute. Bruemmer discusses the early fourfold strategy for CBI to 1) be an advocate for historical records in the archival community; 2) work with other archives on the collecting front; 3) promote the use of CBI's collections; and 4) favor work paring archivists with historians, computer scientists, and records professionals. Bruemmer outlines the accomplishments of CBI in each of these areas from the mid 1980s to late

1990s, including some important publications. He also details CBI's early leadership in making all the CBI finding aids available on the Internet (on Gopher back in 1994).

Kaplan outlines how CBI has continued to focus on the original strategies while also implementing new ones. She discusses examples of the many different users of CBI and the services the Institute provides to academic and other researchers. She addresses some of CBI's current areas of focus in collection development, such as software history, and CBI archivists' continual work to utilize new technology, including Encoded Archival Description (EAD), to help researchers more efficiently locate relevant resources.

CBI Associate Director Jeffrey Yost provides an article on a foundational program of CBI that has been of great significance to the development of the history of computing: the CBI/Tomash Fellowship. In 1989 the CBI Fellowship, awarded annually (from 1978 to the present) to support dissertation research and writing in the history of information processing, was renamed the Tomash Fellowship in honor of Erwin and Adelle's generous support to the CBI and its programs. Many fellows have spent a significant amount of time conducting research at CBI, benefiting from the Institute's collections and assistance from CBI historians and archivists. Yost's article provides a brief historiographical overview characterizing the fellows' dissertations and some of the resulting major publications.

The work of CBI/Tomash fellows is also highlighted in several other articles in the issue. The second CBI Fellowship was awarded to Paul Ceruzzi for his dissertation project on the prehistory of computing. Ceruzzi, Curator of Aerospace Electronics and Computing at the Smithsonian Institution's National Air and Space Museum, contributes an article reflecting on the evolution of the history of computing over the past two decades and the role of *Annals* publication policy in the field's development. Meanwhile, two recent Tomash Fellows, Thomas Haigh and Nathan Ensmenger, contribute historical articles extending from their dissertations at the University of Pennsylvania. Haigh writes on the construction of a new corporate institution - the data processing department - in the mid 1950s, while Ensmenger provides a study of software labor and professional development from the late 1950s to the early 1960s.

Historians of computing Martin Campbell-Kelly (University of Warwick) and Michael Williams (The Computer Museum History Center) contribute articles on two other important endeavors of Erwin and Adelle, the CBI/Tomash reprint series and rare book collecting. Campbell-Kelly writes on the reprint series, published by the Tomashes in collaboration with MIT Press, a project that made many transcripts of important early conferences and writings in the history of computing available to researchers throughout the world. Michael Williams gives an overview of the Tomash collection of rare books in mathematics.

Friends of CBI receive a complimentary copy of each new issue of *IEEE Annals of the History of Computing* from the Charles Babbage Institute. Articles published in the *IEEE Annals of the History of Computing* are available in electronic form for purchase on the

journal's Web site (<http://www.computer.org/annals/>). The print version of the publication is available for use at most major research libraries in the United States.

Software History Project Year Two Report

By Philip L. Frana and Jeffrey R. Yost

During the past year project staff made considerable progress on all three of the primary components of the software history project: the Software History Dictionary, the electronic journal of software history, and the oral history initiative. CBI recently has reported on these activities to the National Science Foundation in its Year Two Annual Project Report. The ongoing activities of the project have also created considerable opportunities complementing ongoing efforts to collect historically significant archival materials.

Recently, CBI project staff members launched the second major phase of “Building a Future for Software History” by forming an editorial board, drawing up guidelines, and establishing a Web presence for the online journal of software history. The editorial board includes distinguished historians, computer scientists, and individuals from industry. The journal, entitled *Iterations: An Interdisciplinary Journal of Software History*, issued a Call for Papers (available at <http://www.cbi.umn.edu/iterations/cfp.html>) several months ago and has received many inquiries and a number of papers submitted for consideration and possible publication. Commitments to write for the launch of the journal have been secured from some of the leading scholars in the history of software as well as pioneering software practitioners. Submissions are welcomed for consideration for publication from anyone interested in presenting original work in the emerging discipline of software history.

The draft version of the Software History Dictionary continued to advance. More than 125 draft entries (from Batch Processing to Iliad and Cyclades to UMES), comprising about 150 pages of text, have been completed since project staff began forming the committees last year.

Progress on the composition of dictionary entries, however, is a laborious process. While external participation has been significant and much appreciated, the Charles Babbage Institute has committed more of its own internal resources than expected in the production of dictionary entries. Ultimately, project staff anticipate that the dictionary will include fewer entries than initially planned, but will nevertheless be a very substantial research tool. To aid external efforts, Software History Project staff members are now actively engaged in the production of dictionary entries. All of the entries are written in accordance with the best principles of research; input is solicited from committee members in identifying the most important concepts to define, and similar feedback is often sought to best determine the content of individual entries. Every entry,

regardless of whether the first draft is completed externally or by CBI staff members is subjected to a final review by a panel of experts from the software community.

Project staff further expanded bibliographic resources to serve the needs of committee members as they engage in writing dictionary entry drafts. The bibliography is also a tool for researchers not involved in the project. More than 1,700 citations to the research and writings on the history of software are now available online at <http://www.cbi.umn.edu/shp/bibliography.html>. The Charles Babbage Institute has received numerous compliments on the scope and fullness of the bibliography. Recommendations from individuals both inside and outside of the software history project have helped further the comprehensiveness of this resource.

CBI's historians have also completed a growing number of research-grade oral histories over the past two years. These oral histories serve as both a research product and as a tool that has aided us in completing other project tasks. Sixteen oral histories have been conducted for the project, a number of which are already available for researchers.

Oral histories, CBI-sponsored software history conferences, solicitations for articles and inquiries about *Iterations*, and other CBI research activities have all helped in identifying collection possibilities, and complement CBI's ongoing collection development work.

CBI has performed extensive outreach in the past year to educate software experts and pioneers about the importance of preserving materials to create an archival record for future historical research. Outreach to this community is critical because many software pioneers are still active, and do not recognize that their achievements might be fitting subjects for historical investigation and that they hold historically valuable records. The preservation of an archival record in this subject area involves an ongoing and continuous effort to identify and contact individuals likely to hold archival records, describe the value of archival preservation, survey records, and advise records creators about the materials in their possession.

Recent software history collections received by CBI include the ADR Records, Curt A. Monash collection, Martin A. Goetz papers, Lamb & Co. collection, and Bob Head papers. Several of the collections are processed and available to researchers. Further collecting will focus on market research, unbundling, enterprise software, middleware, system management tools, artificial intelligence R&D, professional services firms, search technology, dot-coms, software patenting, software standards, information security, and graphics.

“From Sumer to Spreadsheets: The History of Mathematical Table Making”

A Conference organized by the British Society for the History of Mathematics and the Oxford University Department for Continuing Education. Sponsored by the London Mathematical Society.

By Arthur L. Norberg

Tables of one sort or another have been an important feature of mathematical, scientific, religious and business activity for some 4500 years. A group of scholars from Europe and North America concerned with table making assembled on September 22-23, 2001, at the University of Oxford for a weekend conference on the subject. They addressed the technical, institutional, intellectual and social history of tables, from earliest times until the late twentieth century.

Sumerian scribes created coefficient tables for solving problems; Islamic scholars needed astronomical tables for religious observance; European navigators used logarithmic tables for expanding trade and conquest; Victorian insurers developed life tables to manage the risks of life assurance; today business people use dynamic tables (spreadsheets) on their personal computers. What all these activities have in common is representing numerical information in a two-dimensional form. Issues of design and legibility jostle with issues of computational accuracy. The complexity of the real world conflicts with the need to reduce data to a simple two-dimensional grid. In recent decades historians of many disciplines have begun to unearth the exciting story of how table making developed over the centuries, in a wide variety of fields.

The insights brought to bear by recent historiography enable us to position the history of tables as a fascinating confluence of different aspects of human endeavor. In the history of information processing, for example, we can see table making in the modern era as lying at the historical junction between the factory-based production of physical goods and the office-based processing of information. The wide range of users of tables, whether scientific users such as astronomers, mathematicians, physicists, and medical statisticians, or professional and trade users such as engineers, actuaries or navigators, indicates something of the challenge to historians to make sense of an extremely rich field of understanding.

Conference papers can be seen to fall into four loose groups. In one group, authors described various kinds of table making from the 16th to the 20th century. Graham Jagger presented a review of logarithm tables from the 17th century, in particular the work of two British mathematicians, Henry Briggs and Edmund Gunter. I. Grattan-Guinness described the career of Gaspard de Prony and his tables project of the 1790s, during which an array of tables were calculated for various purposes. Inevitably in discussion of table making, one turns to actuarial tables. Christopher Lewin (with Margaret de Valois) offered an

account of the types of tables used to calculate risk and finance. The authors dealt with compound interest tables, life tables, monetary functions and annuity and premium rates, decrement tables, and sickness tables over a period of four centuries, from the 16th to the 19th centuries.

The paper by Edward Higgs on the “General Register Office and the Tabulation of Data” in Britain could easily fall under group one also, thus indicating the significant overlap among papers in the conference. Higgs described the efforts of the office to cope with less than adequate funds and how this affected the analysis of the census data collected. The office’s publications about their methods proved useful in other areas of the economy. David Grier turned to the United States for his example of table making: the Mathematical Tables Project of the late 1930s, a program funded by the Depression agency Works Progress Administration. Among its accomplishments during a ten-year life was *The Handbook of Mathematical Functions*, a compendium of applied mathematics.

A second group of papers focused specifically on table making in astronomy covering three centuries—the 18th to the 20th century. Table making in planetary prediction theory has a double meaning, tables of techniques for making predictions and the tables of predictions. In his presentation, Arthur Norberg discussed both of these meanings. Starting with the use of Newton's gravitational principal, he reviewed the work of the French mathematical astronomers Laplace and Lagrange, the contributions of Leonhard Euler, and the efforts of Urbain Leverrier and Simon Newcomb. The talk ended with a comparison of the contents of the national ephemerides of the middle of the 19th century.

Mary Croarken took a different tack in describing table making in Britain in the century after 1870. She discussed the work of the British Association for the Advancement of Science Mathematical Tables Committee. This committee's work focused on tables for the increasing computation in the physical, mathematical, and engineering sciences. She described the people, processes, and types of tables generated through the committee, as well as the decision to end the committee and its revival through the Royal Society, which also could not keep it vital. The committee dissolved in 1965. Finally, in this group, George Wilkins described the institutional context for table making in Britain, namely, H. M. Nautical Almanac Office and preceding activities in the Greenwich Observatory. Besides discussing the activities inside the office, he related information about various alliances made between the office and other ephemeride offices around the world. In essence, he brought the story of astronomical table making up to the present.

Two papers that could constitute a third group examined difference engines, either Babbage's or of the Babbage type. Doron Swade presented a stirring description of the Babbage difference engine reconstruction project at the Science Museum over the past decade. A fascinated audience watched a film of the reconstructed engine in operation, complete with printer. Tracing the difference engine's history from Johann Müller to Leslie Comrie, Michael Williams described the similarities and differences in these designs and in their use.

The papers in the last group acted as bookends on the conference. Eleanor Robson offered a brief review of extant tablets, read tables, from Mesopotamia covering the 2,500 years before the common era. She illustrated the mathematical system as found on the tablets, and described the types of information that can be gleaned from the tablets, some of which constitute tables of accounts and lists of data. An analogous type of format can be seen in the spreadsheets of the late 20th century, although this analogy was not made by Martin Campbell-Kelly in his paper on the rise of the spreadsheet in contemporary computer computation. After discussing the introduction of the computer type spreadsheet, he described the production and diffusion of spreadsheets by various companies. In one of the few presentations to do so, he discussed users of these spreadsheets.

Discussion following each session, as well as during breaks and meals, was lively, indicating that there is much to be learned from these investigations into table making. The papers are to be collected in a volume to be published next year by Oxford University Press.

CBI's Oral Histories Online

By Elisabeth Kaplan and Carrie Seib

Devoted readers of the *CBI Newsletter* may recall an article in the Winter of 1992 that provided an update on the status of CBI's oral history collection. Nearly ten years has passed since that issue, and it is high time for another update -- and an announcement.

In October 2001, the full text of over 160 oral histories went online in a fully searchable database on the CBI Web site. (CBI oral history database:
<http://www.cbi.umn.edu/collections/oralhistories.html/>)

For those not familiar with the oral history program, CBI holds one of the world's largest collections of research-grade oral history interviews relating to the history of information technology. Topics include: software development, academic computing, ARPANET/Internet, scientific applications, business applications, and information technology industries. Most of the 300-plus oral histories have been conducted by CBI historians in conjunction with grant-funded research projects such as the NSF-sponsored DARPA/IPTO project of the early 1990s and the current "Building a Future for Software History" project.

For archivists, the really interesting story behind CBI's oral history collection is the evolution of methods used to make the interviews available to interested researchers over the years. CBI's archivists have always worked hard to take advantage of emerging technology to enhance access to the collections, and, at the same time, to contribute to the development of descriptive standards for libraries and archives. The archives' stewardship of the oral history collection demonstrates this well over a period of fifteen years.

In 1986, CBI published the *Guide to the Oral History Collection*, compiled and edited by former associate director William Aspray and former archivist Bruce Bruemmer. The guide included abstracts, an extensive index, and contextual information for the 140 interviews that at that time comprised the collection. With the publication of the guide, for the first time, researchers could go to one central source of information on the availability of oral history interviews in this subject area. The guide was widely distributed to libraries and archives nationally. A researcher could identify an interview in the guide relevant to his or her research, and contact the CBI archivists to request a copy of the full transcript. Even then, CBI pushed the technological and archival envelope by providing, as the guide stated, either a photocopy of the transcript or an electronic copy “in ASCII format on an MS-DOS floppy disk.” And, as the 1986 guide noted, CBI was “investigating the possibility of electronically transmitting transcripts over the telephone line,” although the authors concluded that “currently it is easier and cheaper to mail magnetic disks.” How quaint this sounds in the 21st century!

Recognizing the potential of the University of Minnesota's online library catalog for providing access to CBI's oral histories, but frustrated that no standards existed for cataloging oral history interviews, Bruce Bruemmer became heavily involved in a national committee to develop cataloging standards for oral histories. Over the years, Bruce and his staff prepared MARC (Machine Readable Cataloging) records for each interview. Preparing a catalog record is a labor-intensive process that requires training and expertise in both library techniques and the relevant subject area. The CBI archivists assigned extensive subject headings to each interview, which were gleaned from controlled vocabularies such as the Library of Congress Subject Headings (controlled vocabulary makes such materials searchable). The records were added to the Libraries' catalog, and subsequently to the international online bibliographic databases, RLIN and OCLC. The access statement in each catalog record read: “Tape available for use at the Charles Babbage Institute. Transcript available through interlibrary loan or from the Charles Babbage Institute.”

When the first CBI Web site went online in 1995, it included a list of the oral history interviews, each linked to an abstract. Researchers who discovered the oral history collection via the Web would contact CBI to request a transcript. By then, email was sufficiently widespread that the archivists could send electronic copies of the interviews to researchers as Rich Text Format (RTF) attachments. Reference statistics from those years demonstrate that use of the oral histories shot up when the abstracts were placed on the Web.

Which brings us to the summer of 2001, when work began on CBI's oral history text digitization and database project. A number of factors made the oral histories a good candidate for a text digitization project. They had been described in a standardized fashion, extensively indexed, and stored in a standardized electronic format. As a group, they have some critical mass (an important criterion for digitization), but at the same time represent a discreet, relatively small and manageable set of data. Perhaps most important, the CBI archives has statistics on use of the oral histories, and we know them to be highly

valued by a range of researchers. We could be confident that this project would not become a white elephant, as happens sometimes with digitization projects.

CBI archivists Beth Kaplan and Carrie Seib worked with the Libraries Web administrator, Shane Nackerud, to build a database containing abstracts and full text in portable document format for over 160 interviews. (We will continue to add more.) CBI archives student workers undertook a “data entry crusade,” as Shane put it, and completed the necessary work in a matter of weeks. Now that the database is complete, researchers can browse the list of interviewees, search abstracts by keyword, or search using a list of index terms provided. CBI staff can enter data directly onto the server and retrieve detailed statistics on user downloads.

Readers of the *CBI Newsletter* may be interested in the technology was used in construct the database and its Web interfaces.

The oral history database was created with MySQL, the most popular Open Source SQL database. Because it is Open Source, anyone may download and use MySQL free of charge study it and modify the source code. MySQL is a client/server system, which consists of a multi-threaded SQL server that supports different backends, several different client programs and libraries, administrative tools, and several programming interfaces. MySQL AB, a commercial company that provides services relating to the MySQL database, developed MySQL from IBM's SEQUEL, which was introduced as a commercial database system by Oracle in 1979.

Historically, SQL has been the favorite query language for database management systems running on minicomputers and mainframes. Increasingly, however, SQL is being supported by PC database systems because it supports distributed databases. ANSI approved a rudimentary version of SQL as the official standard in 1986, and updated the standard in 1991. The updated standard is known as SAG SQL.

The Web interfaces for the oral history database, including the pages that allow CBI staff to enter data and retrieve user download statistics, were created with PHP Hypertext Preprocessor, a server-side, HTML-embedded scripting language used to create dynamic Web pages (dynamic Web pages, unlike regular Web pages, are created on the fly). PHP is enclosed within special tags and embedded in an HTML document, which gives the author the ability to jump between HTML and PHP instead of having to rely on heavy amounts of code to output HTML. PHP is executed on the server, so the client cannot view the PHP code. One of PHP's strengths lies in its compatibility with many types of databases. It can also “talk” across a variety of networks. Rasmus Lerdorf created PHP sometime in 1994. During mid 1997, PHP development entered the hands of other contributors. Two of them, Zeev Suraski and Andi Gutmans, rewrote the parser from scratch to create PHP version 3 (PHP3). Today, PHP is shipped standard with a number of Web servers.

These technologies, combined with the high quality backend work done over the years by CBI's archivists and the expertise of colleagues in other University of Minnesota

Libraries Departments, made it possible for current staff to plan and execute this project in a relatively short time. With this project, we have made what is a major resource for our users widely available in electronic form, greatly enhancing its value to our researchers, and we've done so at a relatively low cost. We believe this project is a successful demonstration of a practical and sustainable application of technology to archives, and one that we will continue to build upon. Its value has already been demonstrated -in its first month, there were over 500 user downloads!

Please try the database and let us know if you have questions or comments!

<http://www.cbi.umn.edu/collections/oralhistories.html>

News From the Archives

Recent Acquisitions

Especially notable acquisitions this fall include the personal papers of large-scale systems specialist and editor Robert V. Head and the corporate records of Lamb & Company, an early computer graphics and computer animation company.

The Robert Head Papers date from 1956-1996 and document Head's career as an editor and journalist for information technology publications, his work on ERMA and other banking systems, SABRE and other real-time systems, and federal government information technology management. Also included are his talks and writings and records of his activities with professional organizations.

Lamb & Company was founded in Minneapolis in 1980, and may be the country's oldest extant computer graphics and animation company. The company was known as an early adopter of computer graphics technology and served as a test lab for new computer graphics tools. Lamb & Company acquired the prior art of Cranston Csuri Inc., which became the basis for Lamb's internal development efforts. The company's work included computer graphics and animation for advertising, crime scene simulations, and the first computer animation feature in the early 1990s.

Wanted: Silicon Alley Reporter

For five years, the *Silicon Alley Reporter* covered the East Coast Internet and new media industry. It grew from a 16-page photocopied newsletter, in 1996, to a glossy magazine with a circulation of over 100,000. Then, in fall 2001, like so many of the Internet startup companies it covered, the magazine folded.

Some of the most important serials in the CBI archives are those that were published in short runs, and disappeared quickly from the scene. These serials provide snapshots of

unique and brief periods in the history of information technology that are not easily documented by other means.

The *Silicon Alley Reporter* is no longer available from its publisher. We hope, in time, to acquire the full run of this publication, and welcome donations of any issues. Please contact CBI archivist Beth Kaplan at kapla024@tc.umn.edu

SHOT 2001 Meets in San Jose

The annual meeting of the Society for the History of Technology (SHOT) was held October 4-7, 2001 in San Jose, California. The conference's events, including area tours, industry forums, and a number of scholarly presentations, gave special attention to the development of the Silicon Valley region and the history of information technology.

The conference began with a Santa Clara University-sponsored informal dinner and a presentation featuring a panel of three founders of Silicon Valley: Gordon E. Moore, Chairman Emeritus of the Board of the Intel Corporation; Regis McKenna, Chairman of the McKenna Group; and Douglas Engelbart, Director of the Bootstrap Institute and winner of the Turing Award and National Medal of Technology. Historian Paul Ceruzzi of the Smithsonian Institution moderated the panel discussion.

Each of the panelists provided an overview of his career and perspective on his own role in the development of Silicon Valley. Their opening talks, and many of the questions from both Dr. Ceruzzi and the audience, focused on the factors that led to the rise and continued status of Silicon Valley as the premier region for information technology development in the world. The panel explored multifaceted aspects of government funding and private capital in the development of the computing industry and how this changed over time.

In speculating about what was unique to the region, Moore pointed out that venture capital, ideal climate, and top research universities made it a terrific place to start a high technology firm, but a poor place to grow one due to the accelerating cost of land and labor. He also stressed the significance of William Shockley's decision to move to the region in the mid 1950s (to be near his mother) and found Shockley Semiconductor Company in Sunnyvale, California. A small group of engineers from this firm would later break off and form the Intel Corporation. McKenna, drawing upon his long experience as a leading consultant to many of the top high-tech firms in the region, stressed the importance of technological development, downplaying the role of marketing. He indicated that a successful advertising slogan and associated branding, such as "Intel Inside," was possible only because of the superior technology the microprocessor firm was delivering. Engelbart provided a number of insights on the nature of technological development within key institutions, including the Stanford Research Institute (SRI) and the Xerox Palo Alto Research Center (PARC).

Over the course of the next three days there were several sessions on the history of computing and a number of additional papers on the topic that were a part of thematic sessions on social, cultural and industrial history cutting across various technologies. One particularly interesting session was “The Many Faces of Cybernetics,” organized by Jennifer Light of Northwestern University. The session addressed areas in which cybernetics ideology influenced science and society. Light gave a paper on the role of cybernetics in urban planning during the 1950s and 1960s, using Pittsburgh as a case study. Deborah Weinstein of Harvard University followed with an examination of how cybernetics thought influenced family therapy. MIT's David Mindell provided important analysis of the influence of cybernetics on engineers, astronauts, and the Apollo Missile Guidance Computer. Finally, Thomas Stapleford of Harvard University examined the breakdown of symbiosis in human-machine systems, or the “cybernetic vision.”

The diversity of the presentations on cybernetics was indicative of the broad scope of papers on the conference program addressing the social, intellectual, cultural, and business history of information technology. Among the topics addressed were: product innovation and defense contracting in the semiconductor industry (Thomas Heinrich); telecommunications history and the National Library of Medicine (Hunter Crowther-Heyck and Michael Sappol); geographic information systems (John Cloud); Microsoft and the open source issue (Alexander Brown); computer networks and global spaces (Paul Edwards); the Internet and frontier ideology (Virginia Eubanks); socialist cybernetics in Allende's Chile (Eden Miller); government policy and computing in Denmark in the 1960s (Petri Paju); domestication of computing (Jaakko Suominen); the digital divide (William McIver, Jr.); data processing managers and professionalization (Charles Yood); and data security (Greg Downey).

The annual special interest group luncheon on the History of Computing Issues met on Saturday. More than two-dozen historians and other scholars attended and discussed their current research activities in the field. CBI Associate Director Jeffrey Yost gave a brief overview of the historical research and collection development programs of the Charles Babbage Institute and the CBI Software History Project Manager Philip Frana gave an update on CBI's NSF-sponsored project, “Building a Future for Software History.”

Jeffrey R. Yost

Using History to Improve Undergraduate Teaching of Computer Science

**By William Aspray, Executive Director
Computing Research Association**

With support from the National Science Foundation, the Computing Research Association held a workshop for undergraduate teachers of computing-related disciplines at Amherst College in August 2001. The workshop examined ways to use history to

improve undergraduate teaching. An audience of about 30 joined the eleven speakers. The program and speaker bios can be found at <http://www.cra.org/Activities/workshops/history/august01.html>.

In a fast-moving, forward-looking field such as computer science (or other computing-related disciplines), where curricular concerns are often focused on cramming in as much technical information as possible, the addition of modest amounts of history into the established curriculum can have highly salutary effects. These include:

- helping to teach introductory students about the nature and uses of computer science;
- motivating interest in the material by showing where it originated;
- demonstrating how the technical material being taught fits into a larger scientific structure;
- giving students a sense of the tremendous progress and pace of development in the field, and what that progress means in social terms;
- offering historical case studies for use in teaching the ethics of computer science;
- providing role models, including ones that enhance diversity; and
- using case studies to help students understand the political, social, and managerial issues they will face when they enter the working world as computer scientists.

A second and final workshop will be held in late April 2002 in Minneapolis. The program for the second workshop will not significantly overlap that of the first workshop, nor is the first workshop a prerequisite for the second. Twenty scholarships that provide food and lodging (but not travel) will be available. For information about exact dates, exact location, program, and scholarships, check the main CRA web page www.cra.org.

Gertrude Blanch

By David Alan Grier, Associate Professor of Computer Science and International Affairs, George Washington University

I learned of Gertrude Blanch through a footnote. In an article on the SEAC, Ralph Slutz made a passing reference to a computing organization that was operated by the Works Projects Administration during the Great Depression. He described a roomful of workers who were slaving away on computations with nothing more than a paper and pencil. I spent hours in the National Archives, trying to piece together the story of this organization. This computing organization lasted for ten years (1938 to 1948) and proved to be the foundation for the National Bureau of Standard's computer development effort. In reading the records, I learned that its leader was a diminutive woman, a generous inch short of five feet, but tenacious, hard working and dedicated to the science of computation.

The directory of the American Mathematical Society listed a California address, to which I immediately sent a letter. It took several months for me to learn that I had barely missed her. She had died just a few weeks before I sent the note. But my inquiry opened new contacts for me and led to the records that are now part of the CBI collection. These records help to reveal a life, which is a testament to what a late bloomer can accomplish.

Blanch entered college at the age of thirty-two, after working for nearly fifteen years as an office clerk to support her family. If she had known G. H. Hardy's dictum that no mathematician accomplishes much of importance after the age of twenty-five, she would have likely have ignored it. She graduated *magnum cum laude* with a double major in mathematics and physics. Cornell University gave her a fellowship and she completed a PhD in Mathematics four years later, under the guidance of Virgil Snyder.



The world of 1934 greeted her after graduation. The Great Depression had little room for new academics and even less space for academics who were women and of Jewish ancestry. She returned to office work, only to be recruited one year later to be the technical director of a new WPA project, which would be known as the Mathematical Tables Project.



During its ten years of operation, the Math Tables Project was the largest scientific computing organization in the country. At its peak it employed four hundred and fifty human computers. Blanch was responsible for preparing computing plans, disciplining the computers and checking the results. The tables produced by the group are now largely ignored, but they were heavily used in their day. The group also did special computations for scientists like Hans Bethe, Philip Davis, George Dantzig and Jerzy

Neyman. The famous computing lab at Los Alamos was based upon the structure of the project. The most lasting legacy of the group is the *Handbook of Mathematical Functions: With Formulas Graphs and Mathematical Tables* (1964), which was edited by two of Blanch's assistants, Milton Abramowitz and Irene Stegun.

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Please note: The family of Gertrude Blanch donated the Blanch Papers in early 2001, and the collection is now available for research in the CBI archives. The collection includes lectures, publications, professional correspondence, and photographs of Blanch alone and with colleagues. Also included are audiotapes of two interviews with Blanch, one by historian Henry Thacher, and the other by her nephew, Michael Stern.

Recent Publications

Aspray, William. "Adelle and Erwin Tomash: Honoring a Couple's Contributions to Computer History" *IEEE Annals of the History of Computing* 23:4 (October-December 2001) 2-3.

Aspray, William. "Erwin Tomash: His Life and Work" *IEEE Annals of the History of Computing* 23:4 (October-December 2001) 4-11.

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Head, Robert V. "ERMA's Lost Battalion" *IEEE Annals of the History of Computing* 23:3 (July-September 2001) 64-72.

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Van Burnham and Ralph H. Baer. *Supercade: A Visual History of the Videogame Age, 1971-1984* (Cambridge: MIT Press, 2001).

Williams, Michael R. "Building a World-Class Book Collection: The Tomash Library" *IEEE Annals of the History of Computing* 23:4 (October-December 2001) 39-43.

Yost, Jeffrey R. "CBI/Tomash Fellowship: Sponsoring a Generation of Scholars in the History of Information Processing" *IEEE Annals of the History of Computing* 23:4 (October-December 2001) 24-28.

Compiled by Jeffrey R. Yost

Featured Photo

37 Years Ago



On November 3, 1964, the Burroughs Corporation teamed up with ABC News to provide election night coverage of the Johnson/Goldwater presidential race and other congressional and gubernatorial elections. The nine-hour live television broadcast from the Burroughs-ABC News Election Headquarters in New York City reached more than 150 million viewers and, in conjunction with pre-election night promotion, generated millions of dollars worth of publicity for Burroughs.

Two Burroughs B5500s tabulated, analyzed, and reported the votes of over 70 million Americans. Representatives of Burroughs, ABC, polling and political analysis firm Oliver Quayle Associates, and C-E-I-R, Inc. (the data processing firm that programmed the B5500s) used the B5500s' reports to decide when to announce election forecasts on the air. According to the November 1964 edition of the Burroughs B-Line (E&S Marketing Division Edition), the Burroughs-ABC team provided "the most accurate

results of the election throughout the evening," and "remained the only one of the three network election teams that did not have to reverse any of its projections on the various presidential, congressional, and gubernatorial contests." Burroughs also provided Sensimatics, proof machines and adding machines for general accounting purposes as part of a nation-wide vote tabulating system organized and established that year by ABC, NBC, CBS and the two major wire services, Associated Press and United Press International.

Carrie Seib