CHARLES BABBAGE INSTITUTE

NEWSLETTER

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CENTER FOR THE HISTORY OF INFORMATION PROCESSING

Interviews with Icon Developers

by David S. Cargo
Cray Research, Inc.

A workshop on the Icon programming language took place at Northern Arizona University in Flagstaff, Arizona on 25–27 July 1990. The workshop offered a fortuitous opportunity to interview a broad cross-section of people involved with Icon over the years.

I interviewed Professor Ralph E. Griswold and Madge T. Griswold. (Madge Griswold is president of The Bright Forest Company, which is involved in business ventures that relate to the Icon programming language.) I also interviewed four former or current graduate students who worked on Icon for Professor Griswold: Stephen B. Wampler (now with the College of Engineering at Northern Arizona University), William H. Mitchell (now with Sunquest Information Systems), Gregg M. Townsend and Kenneth Walker (both with the Department of Computer Science at the University of Arizona). Finally, I interviewed two people who first adapted Icon to new systems, Robert E. Goldberg (with Dewar Information Systems Corporation) and Cheyenne Wills (who acted as an independent consultant for the Icon Project).

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Philipp Matthäus Hahn Exhibitions

by Dr. F. W. Kistermann

To celebrate the 250th anniversary of the birth year and the bicentenary of the year the death of Philipp Matthäus Hahn (1739-1790) five towns in the State of Baden-Wuerttemberg, Federal Republic of Germany—namely Albstadt-Onstmettingen, Echterdingen, Kornwestheim, Scharnhausen, and Stuttgart—organized exhibitions that were open from the last week in November 1989 until the end of January 1990. These exhibitions were made possible by the coordinated, five-year efforts of a large number of people interested in Ph. M. Hahn and his exceptional life and work and, last but not least, by the financial support from the State of Baden-Wuerttemberg and the five towns.

Ph. M. Hahn was a pastor, a theologian, a practical mechanic, and an entrepreneur who built, during his well-known and highly esteemed clerical and theological life work, quite a number of clock-driven planetariums and long-case clocks and who founded a substantial fabrication of pocket watches, etc.[1] When he came to Kornwestheim to become pastor of its parish, he immediately set up a workshop and began working on his "Weltmaschine." To reduce the time and labor of the necessary calculations for his clock-driven planetariums, especially his "Weltmaschine," he decided to build a calculating machine. Two of his calculating machines survive, in museums at Stuttgart and Mannheim.

Therefore the Kornwestheim exhibition included a section on the "History of Computing," which was open until 25 May 1990, longer than the others. I did the research and the design, mainly the architecture and the implementation (to use computer design language) for the exhibition that spanned the "History of Computing" from the Roman numerals and abacus until the foundation of the first German factory for Calculating Machines (1878) in Glashuette/Sachsen.

The themes of the displays and showcases were the following: Roman Numerals; Roman Abacus; Counting Cloth and "Rechenpfennige;" Arabic Digits and Decimal Fractions; "multiplication per gelosia" and Counting Bones; Schickard's Calculating Machine; Discovery of Logarithms and the Slide Rule; Calculating Machines of the 17th and 18th Century: Pascal, Leibniz, Gersten; Computing for the Construction of Astronomical Machines; Hahn's Calculating Devices: Tables of Products, Calculating Drum; Adding Machine; Hahn and His Calculating Machines; Stepped Wheel Model;

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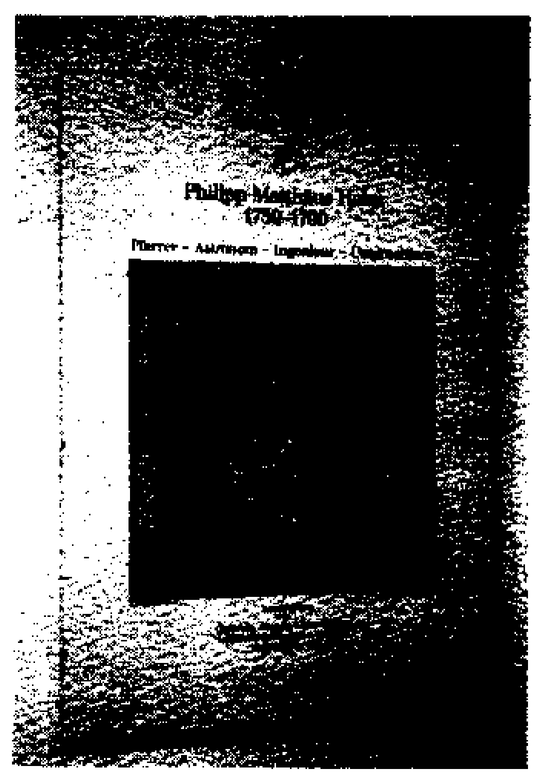

The poster for the Kornwestheim exhibition. Photograph by F. W. Kistermann

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The interviews cover many of the significant events in the history of Icon: the first version of Icon in C (Wampler), the first version of Icon with detailed instructions for porting to new systems and the first version with greatly reduced requirements for assembly language support (Mitchell), the first version of Icon for MS-DOS (Wills), and the first version of Icon for VAX/VMS (Goldberg).

One emphasis in the interviews is on the methods used to keep the Icon Project operating continuously and productively over such a long period of time. After editing and review, the interviews will become part of the oral history collection of CBI.

This was the second workshop for the Icon programming language; the first was on 26–28 July 1988. The workshop was attended by the Icon Project group at The University of Arizona and others closely related with Icon. The workshop itself dealt with subjects of interest and concern to Icon implementors and users. Perhaps of most interest to Icon users was the opening session, which covered Icon's status and future. At the present time, there are no plans to change the language again. While details of the implementation may change, the language definition can be considered frozen.

Other sessions covered changes in the internal operation of the existing system (the implementation of sets and tables), experimental changes in memory management, enhancements to the Icon system that do not involve changes to the language (an Icon compiler and an Icon programming environment), Icon education, and object-oriented Icon.

The Icon Project made a substantial and lasting contribution to research in the design and implementation of programming languages for non-numeric applications. Its continuing evolution and distribution have served its user community well. The Icon Project has supported Icon by making many technical reports and project documents available to the Icon community (including reports about the workshops). Also, Icon implementations are available freely (if copied over the Internet) or at low cost (a copying fee for media ordered from the Icon Project).

The Icon Project also has some parallels with other university-run projects that have produced worthwhile, useful software available at little or no cost to users. Two examples that come readily to mind are T_EX, the typesetting language produced by Donald Knuth at Stanford, and Kermit, a file transfer protocol and many implementations that are managed by Columbia University. □

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The Charles Babbage Institute, Center for the History of Information Processing, is sponsored by the University of Minnesota and the information processing community. Arthur L. Norberg, Director

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Electronic Mail Addresses for CBI Staff

Arthur L. Norberg, Director:
ANorberg@umnacvx.bitnet

Bruce H. Bruemmer, Archivist
BBruemmer@umnacvx.bitnet

Judy O'Neill, Research Fellow
JEO@umnacvx.bitnet

When You Move...
Please let us know your new mailing address. This will ensure your receiving the *CBI Newsletter* on a timely basis and also save us postage costs. Thank you.

Icon Programming Language

The Icon programming language is a by-product of an ongoing research program whose goals are the design and implementation of high-level programming languages that emphasize non-numerical computation—the manipulation of textual data and structures.

Icon is a programming language that provides high-level features for processing symbolic and numerical data—lists, sets, tables, character strings, and user-defined structures. Applications written in Icon perform such tasks as rapid prototyping, verifying or reformatting data, analyzing natural languages, formatting or reformatting documents, writing other computer programs, artificial intelligence, and many others.

The roots of Icon go back to the SNOBOL programming language, culminating with SNOBOL4. These languages were developed at Bell Telephone Laboratories in the 1960s. Since 1971, this work has been done at the University of Arizona.

The first inspirations for Icon were in 1976. The original implementation was done in Fortran (using the Ratfor preprocessor) with an emphasis on portability. Version 2 of Icon was the last Fortran-based implementation.

With Version 3, the basis of the implementation was changed to use the C programming language. Until Version 6, there was a substantial component of assembly language. Version 6, however, was written almost entirely in C and hence it and subsequent versions are substantially more portable than previous C-based implementations.

Version 8 is the current version. It runs on the Amiga, the Atari ST, MS-DOS, the Macintosh, OS/2, OS-9, VAX/VMS, MVS, VM/CMS, and UNIX (58 different platforms, at last count).

The major version numbers associated with Icon (1, 2, ..., 8) reflect significant changes in the design of the language itself, not just implementation differences.

Much of the success of the present implementation has come from the many persons who have adapted earlier versions to different computers. Each of these efforts contributed to the portability of the present system.

Grants from the National Science Foundation have supported most of the work on the Icon programming language. In addition, computational facilities and staff support have been provided by the Department of Computer Science at the University of Arizona. For information about Icon implementations, please contact Professor Ralph Griswold at the University of Arizona, e-mail address: icon-project@cs.arizona.edu. □

Smithsonian and Rand Co-Sponsor Symposium on Rand's Early Computer History

The Smithsonian Institution's Videohistory Program and The Rand Corporation co-sponsored a two-day symposium on RAND's early computer history. The symposium consisted of four sessions of videotaped group interviews with people instrumental in RAND's early hardware and software development. The symposium was held 12–13 June 1990 at RAND's corporate headquarters in Santa Monica, California. Paul Ceruzzi, curator of the Smithsonian's National Air and Space Museum, and Willis Ware from Rand's corporate research staff co-moderated the sessions.

The first session focused on early hardware (beginning in 1946), with specific discussion about the SWAC, JOHNNIAC, REAC, and other machines instrumental in Rand's design, development, and application of computer hardware. Artifacts, charts, and photos were incorporated in the discussion. Participants were Paul Armer, William F. Gunning, William P. Myers, Robert T. Nash, and Keith Uncapher.

The second session, composed of Armer, Morton I. Bernstein, J. Clifford Shaw, and Irwin Greenwald, looked at early software development (beginning in 1946), specifically Rand's use of plugboard programs for scientific/engineering calculations, programming for an analog computer, JOSS, user documentation, and the famous Rand book of random numbers.

Participants in the third session looked at hardware design for early graphics capabilities, including the design and development of the Rand Tablet and the stylus as well as the creation of an interface built specifically for JOHNNIAC. Bernstein, Armer, Ray Clewett, and Thomas Ellis participated.

The final session delved into Rand's graphic capabilities. Ellis, Gabriel Groner, Edward DeLand, and Barry Boehm spoke about tablet operation and application, high resolution graphics, adaptation of basic symbols of flow charts, and general purpose capabilities. They also reviewed GRAIL, BioMod, CLINFO, and other methods designed to analyze clinical research data. Robert Anderson co-moderated the last session with Ceruzzi.

Videotape masters and use copies will be deposited in the Smithsonian Institution Archives for both long-term storage and research and will be available to interested scholars. All interviews will be transcribed; finding aids and other materials will also be prepared. For more information contact Terri Schorzman, Programs Manager, Smithsonian Videohistory Program, Smithsonian Institution, Arts & Industries Building, Room 2135, Washington, D. C. 20560. □

Berkeley Papers Inventory Available

An inventory to the papers of Edmund C. Berkeley was completed over the summer and is available to researchers. The papers, comprising over 75 cubic feet, were acquired last year from Berkeley Enterprises (see *CBI Newsletter, Spring 1989*). The size and scope of the collection lengthened the task of processing the collection and has occupied much of the time of Patricia Hennessy, assistant to CBI's archivist.

The 37-page inventory is a basic introduction to the collection, which Berkeley had organized into approximately 400 file classifications. Although the collection is centered on Berkeley's interest in computers, it also contains information outside the area of computing. For example, the collection has a reference file on over 200 social action organizations of the 1960s. The CBI staff itself has used the records in research on artificial intelligence, the Association for Computing Machinery, robotics, and ethics in computing.

Researchers interested in obtaining a copy of the inventory (in paper or machine-readable form) should contact the CBI archivist. □

The Adelle and Erwin Tomash Fellowship in the History of Information Processing 1991-92

The Charles Babbage Institute is accepting applications for the Adelle and Erwin Tomash Graduate Fellowship to be awarded for the 1991-92 academic year to a graduate student whose dissertation will address some aspect of the history of computers and information processing. Topics may be chosen from the technical history of hardware or software, economic or business aspects of the information processing industry, or other topics in the social, institutional, or legal history of computing. Theses that consider technical issues in their socio-economic context are especially encouraged.

There are no restrictions on the venue of the fellowship. It may be held at the home academic institution, the Babbage Institute, or any other location where there are appropriate research facilities. The stipend will be $7,000 plus an amount up to $2,500 for tuition, fees, travel to the Babbage Institute and relevant archives, and other approved research expenses. Priority will be given to students who have completed all requirements for the doctoral degree except the research and writing of the dissertation, though less advanced and incoming graduate students are also eligible to apply. Fellows may reapply for up to two one-year continuations of the Fellowship.

Applicants should send biographical data and a research plan. The plan should contain a statement and justification of the research problem, a discussion of procedure for research and writing, information on availability of research materials, and evidence of faculty support for the project. Applicants should arrange for three letters of reference, certified transcripts of college credits, and GRE scores to be sent directly to the Institute. There is no special application form.

Complete application materials should be received by 15 January 1991 by the Charles Babbage Institute, University of Minnesota, 103 Walter Library, 117 Pleasant Street S.E., Minneapolis, MN 55455, U.S.A. The number of awards is dependent upon funding. □

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Hahn's Achievements; Calculating Machines in Hahn's Time: Müller, Schuster, Auch; Müller's Stepped Wheel and Ten Carriage Model; Why Was There No Success for Calculating Machines; Tables and Quick Calculating Books; Calculating Machines of the 19th Century: Thomas and Burkhardt.

This was shown on approximately 80 square meters and concentrated mainly on the stepped wheel calculating machines. It was the first time that a great number of antique calculating machines and devices were shown in an exhibition in Germany: (originals/replicas) 7/4 calculating machines and 6/1 calculating devices.

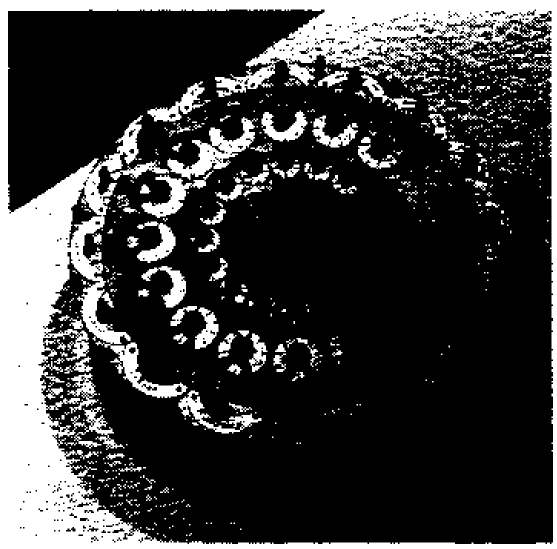
A two-volume catalogue (36 publications in 540 pp. and a catalogue, 574 pp., in German)for the five exhibitions was produced.[2]

Very little was known about Hahn's calculating machines at the beginning of the research for the exhibition, though these calculators were seen in the literature as the most sophisticated ones that have been built since Schickard's calculator. Why did Hahn build calculating machines with 9, 10, 11, 12, and 14 digit capacity? How did Hahn calculate the gearwork for his numerous astronomical devices and the clocks?

Besides the results concerning Hahn's calculating machines, one astonishing result was that Hahn invented the stepped wheel independent from Leibniz and that Leibniz did not have influence on the inventors and builders after him. The reason: Leibniz' calculating machine from 1784 until 1879 was hidden in the attic of a university building in Goettingen, State of Lower-Saxonia in Germany. And it was only in 1894 that the stepped wheels came to light and were documented (photographed) during the restoration work by Arthur Burkhardt. □

[1] King, Henry C. "Geared to the Stars. The Evolution of Planetariums, Orreries, and Astronomical Clocks." Toronto; Buffalo: University of Toronto Press, 1978. 442 pp., 214 fig.; Ph. M. Hahn, pp. 232-242.

[2] "Philipp Matthäus Hahn—Pfarrer, Astronom, Ingenieur, Astronom." Vol. 1., Publications; Vol. 2, Catalogue. Stuttgart: Wuerttembergisches Landesmuseum 1989 (in German). 540 + 574 pp., fully illustr. □



Ph. M. Hahn's 12 digit calculating machine, 1784.
Photograph by F. W. Kistermann

Forum for History of Human Science

Forum for History of Human Science (FHHS) is a new organization that has been formed to promote scholarship in the history of the social and behavioral sciences. "Human science" is broadly defined and encompasses anthropology, economics, geography, history, linguistics, political science, psychiatry, psychology, sociology, and statistics as well as aspects of the biological and physical sciences, medicine, education, law, and philosophy. The primary aim of the organization is to foster research and education in the history of human science and to encourage communication among scholars, scientists, and others working in the area.

Membership in FHHS is open to interested individuals; dues are $10 per year. Please make checks payable to FHHS and direct them and any inquiries to Laurel Furumoto, FHHS Corresponding Secretary, Department of Psychology, Wellesley College, Wellesley, MA 02181; telephone 617, 235-0320, extension 3020. □

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