Saul Gorn

Born November 10, 1912, Boston, Mass.; died February 22, 1992, Philadelphia, Pa.; educator, mathematician, computing pioneer, philosopher of computer development, and central figure in the philosophy of computer language design.

Education: BS, cum laude, mathematics, Columbia College, 1931; diploma of higher studies in mathematics, University of Bordeaux, France, 1932; PhD, Columbia University, 1942.

Honors and Awards: ACM Distinguished Service Award, 1974.

Gorn was born November 10, 1912, in Boston. His family moved to New York City where his father was an editor of the Jewish Daily Forward and where Gorn attended a high school of science. He graduated cum laude in mathematics from Columbia College in 1931 and into the depth of the Depression. An exchange fellowship allowed him to study newer areas of geometry at the Institute of International Education at the University of Bordeaux, from which he received the diploma of higher studies in mathematics in 1932, returning to the US with hundreds of mathematics books in French, purchased by skimping on his living expenses. He was a reader and instructor at Columbia until 1938 and then taught as an instructor in the evening session at Brooklyn College until 1942. In that year he received his PhD from Columbia and entered the Army as a private in the Air Force. His first duty was teaching illiterate recruits to read. His mathematics doctorate led to a commission as a first lieutenant in Wright Field's radar laboratory in Dayton, Ohio. At that time he married short story writer and novelist Frances Schlesinger.

He participated in the Army's computational development at Wright Field, first as an officer and then, following the war, from 1946 to 1951, as a civilian staff mathematician in the Aircraft Radiation Laboratory. He then served as mathematics adviser for the computing laboratory at the Ballistic Research Laboratory, Aberdeen Proving Ground, which had just received from the Moore School of Electrical Engineering of the University of Pennsylvania the first and only ENIAC and EDVAC computers. Here he developed computer procedures for calculating firing tables and methods of automatic error control, and made the first experiments in devising universal coding systems that could be used for more than one variety of computer.

In 1955 he joined the faculty at the Moore School as an associate professor. In 1957 he became the first director of the University of Pennsylvania Computer Center, which used a very early UNIVAC I. In 1960 he was named director of the Office of Computer Research and Education, a post which he held for one year before returning to fulltime teaching and research at the Moore School. In 1964 he became professor of computer and information science.

While he was chair of the university's Graduate Group in Computer and Information Science, the university, under his guidance, granted the first named PhD in computer science ever given anywhere.[1] In the decade just

[1] To Richard L. Wexelblat.

before this milestone event, in the late 1950s and early 1960s, the academic world was struggling with the question of where computing was to be fitted into its often hidebound structure. Was it a subdivision of mathematics or electrical engineering? Would it last or would it fade away? Did it have enough philosophical and intellectual content to be considered in any way a science in its own right?

Gorn argued that computer science was a worthy addition to the academic potpourri. His 1963 paper, “The Computer and Information Sciences: A New Basic Discipline,” is considered to be the first formal mention of computer science as a discipline. Gorn improved on the concept in his 1967 paper, “The Computer and Information Sciences and the Community of Disciplines,” which went from its first publication in *Behavioral Sciences* into a 1970 French translation in *Analyse et Prevision,* and thence, in reviews and quotations into social science journals everywhere. His arguments gave the needed aura of respectability to this novel discipline, allowing the formation of hundreds of computer science (and equivalent) departments throughout the world. In essence, Gorn applied his broad educational and life experience to convince his academic contemporaries, within and without the computer field, that the computer was of more than mere practical importance; it had philosophical importance and the discipline associated with it had intellectual content even beyond that of electrical engineering. This was a political and intellectual coup that only someone of Gorn's character could have accomplished.

He was an international figure, serving as a leading philosopher of computer development, a central figure in computer language design, and a prophet of the future impact of the computer on society. His theory of mechanical languages, based on the work of modern philosophers, has become a central guideline for both theorists and practical computer language developers. His work on standards with the American National Standards Institute led his colleagues to agree to move toward a single set of rules for computer hardware and software, a consummation not yet reached but devoutly to be wished.

In 1974 the Association for Computing Machinery (ACM), which he helped to found and whose journals he helped to edit, awarded him its Distinguished Service Award. The citation praised his contribution to the standardization of computer languages.

Gorn's contributions to actual working computer technology paralleled his philosophical concepts. Many basic ideas, later developed commercially, stemmed from experiments tried out with his students and coworkers on such early machines as ENIAC, EDVAC, Univac I, and the Burroughs computers, all developed in the Philadelphia area. Present-day language and programming techniques involve innovations out of these contributions. He passed many of these ideas on into commercial computers while serving as a consultant to Burroughs, IBM, Sperry-Rand, RCA, and Electricité de France, and gave them to the world through public lectures and his writings, which include 30 articles in technical journals and more than a dozen reports to the Air Force and the Army. Some of the earliest efforts on the validation, or proof of the correctness, of programs are found in his 1973 paper on proving computer symbol manipulation.

His associates knew him as a man of gentleness and gentility of whom it was said, “He has no enemies.” Knowledgeable in music and the dance, he produced many original ideas as to how computers might aid these

arts, including investigations into the use of choreographic languages with computers. He was admired and loved by his colleagues for his humorous open critique of communication styles.

His mechanical languages theory involved the consideration of paradoxes. As practical ordinary-life examples of linguistic paradoxes, which were always part of his theory of mechanical languages, he collected, and often used in conversation and in his writings, simple self-contradictory sentences, often comedians' one-liners. In 1985 he published a list of several hundred of them as “Self-Annihilating Sentences: Saul Gorn's Compendium of Rarely Used Clichés,” starting with “This book fills a much needed gap” and ending with “Things are more like they used to be than they are now,” and including “Down deep, he's shallow,” as well as “Reality is an illusion.”

Always interested in students, his last position before retirement to emeritus status in 1983 was as undergraduate curriculum chairman of the department he developed. He was a member of Phi Beta Kappa, Sigma Xi, the Franklin Institute, the Society for Industrial and Applied Mathematics (SIAM), and ACM, and a fellow of the American Association for the Advancement of Science and the American Mathematical Society.[1]

Immediately following the announcement on the Internet of Saul's death, the following messages were broadcast:

> Saul Gorn, a pioneer of Computer Science died last weekend. A response to my posting (to a smaller mailing list) of the NYT death notice leads me to believe that Saul was not very well known, or at least not well known to the younger generation. I guess that's not surprising. Although he was very active in earlier years—founding member and early officer of ACM, I believe he didn't publish very much and some of his publications were in very obscure (from the CS mainstream) places. Since I don't have sources to check, the following should be considered reminiscence, not history.
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> Saul was a mathematician at Aberdeen when ENIAC came along. He learned how to program it and (I don't know what, if anything came in between) ended up at the Moore School. If programmers got serial numbers-perhaps Lady Lovelace would have number 1—Saul's number was certainly below 25. I knew him as a Professor at Penn when I was a grad student there. He taught numerical math, strictly from the classical point of view: splines and isoclines. He taught the basic programming languages courses and he taught a course called compilers, but it was strictly theoretical (and the theory was pretty sparse in those days). He felt that we should be able to prove program correctness, and developed a process he called command recursion. Those who have studied Denotational Semantics would see some of the invariant and lattice theory in his papers. I don't know if Saul had contacts with Chris Strachey, but that wouldn't surprise me. He was certainly influential in getting several important CS researchers to join the Moore School.

[1] From Ann. Hist. Comp., Vol. 14, No. 3,1992.

Long before “what's-his-name” (from Ohio State and the *Scientific American),* Saul was interested in ambiguity and self-referencing. This particular bent of his cost me close to a full extra year in finishing my dissertation. Self-referencing (which he called unstratified control) meant that a machine language was in some sense more powerful (read: more virtuous) than a “stratified” language like Fortran. Therefore, clearly, an operating system *must* be written in assembly language. It was only a couple of years later that I realized I could have implemented 95% of my system in Fortran taking 6 rather than 18 months. Oh, well.

During my time in and around Penn, no one ever finished a PhD for Saul, but several did master's degrees. Despite this, he was very influential, having a hand in virtually every aspect of graduate studies, from counseling to curriculum development to preliminary exams to defenses. He chaired my defense committee. I'll never forget my defense: I had a yelling, screaming argument with my advisor with Saul as chair, trying to mediate. Bob McNaughton was trying to keep from laughing, and John Carr, new to the Moore School, was trying to figure out what was going on. Saul did eventually restore order. I never saw him afterwards but he reminded me of that absurd day.

He was always writing a book with Al Perlis but I think nothing came of it. Nothing in book form, I mean. Perlis' periodic visits were gala affairs at the Moore School as Al and Saul would gather up a party of faculty and grad students and we'd go to the South China Restaurant and hog out. Perlis would order and we'd eat whatever we were given. I suspect Al and Saul picked up more than their share of the tab.

During the early 1980s when my son was at the Moore School, Saul was retired and mostly doing undergraduate advising. He told me that he knew he had achieved one of his major goals in life when the undergraduate computer science degree was established.

(*Richard L. Wexelblat, Editor, A CM/SIGPLAN Notices.)*

How sad! Yes, I did know him. He was still an active professor when I was at Penn (and seemed ancient to me at the time). He taught undergrad theory and was undergraduate program director, both jobs I suspect no one else in the department was willing to take on. My funniest memory of him is that his theory class was back-to-back with another course that most of us took (I can't remember now what it was), but he would always run over the period, making us late for the next class. Finally one day someone planted an alarm clock in the wastebasket right next to the lectern which went off promptly at the end of class. I think he jumped a few feet when the thing went off to gales of laughter in the class. Of course we were all extremely late for our next class that day as we had to suffer through an extra-long lecture, first about the material and then about the seriousness of it. Still I guess it was worth it as it really is one of the few things I remember from the class.

My memory of him that showed how much he did care about the undergraduate curriculum is the hard time he gave me about approving mine. At the time (maybe still, I don't know) we were required to have

our entire 4 years of courses approved as “meeting the requirements of the major.” Technically we were supposed to do it sometime in late sophomore, early junior year, but due to changing availability of courses and general procrastination, we all put it off until our senior years. As far as I could tell I had fulfilled all the requirements and my advisor had been cheerfully signing off each semester's worth of courses without ever looking at them, so I figured getting the 4 years’ worth approved would be a piece of cake. No dice-Prof. Gorn looked over my courses and began to lecture me on my lack of classical studies, no philosophy, no literature, no history (I studiously avoided them for several reasons, one being that I enjoyed them as hobbies and didn't want to make them work, and the other that writing papers while taking an engineering load at Penn was nearly impossible). Anyway, I managed to convince him that I was still fairly literate and had worked hard and “done good.” Despite the haranguing, he convinced me that someone in the department was vigilant for the cause of undergraduate education.

Probably more than you expected to get in response, but as I've recently been thinking a lot about what kind of faculty member I might make, you triggered a few memories. Thanks for forwarding the mail.

Adele Howe, University of Massachusetts

Dick [Wexelblat] did a nice job of paying tribute to Saul Gorn and I echo everything he noted (including the PhD dissertation defense when once again the faculty member had to be led from the room—I guess Saul was getting good practice at diplomacy ...) .

Saul was the first person I had met who always had a new twist on how to approach a problem, on how to evaluate a situation that you thought was straightforward, and to show how many different ways of looking at it there were if you were being careful. He was the ultimate “spin doctor,” in the intellectual sense. Talking to him was for me always a high-intensity affair, where I had to be on my toes all the time to follow the argument. He was an inspired teacher, and gave lovely lectures, and in his own peculiar way, deeply cared about the people around him-he was a mensch.

One personal anecdote. He hammered home some of his favorite points perhaps a bit much. So when Dick and I approached him on what to study for prelims, and he started in on some of his favorites, I beat him to one punch, by blurting out without checking myself “digital computer: common storage of data and instructions . . . awk.” Saul at most raised an eyelid at this parrot imitation and calmly went on with the catechism, ignoring my impertinence in a good-humored way. In pace requiescat!

Andy van Dam, Brown University

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UPDATES