

B. The World War

The second world war, by actual or de-facto conscription, drew vast number of academics into much more practical concerns. The emergent computer scientists were not particularly unique in this regard; they were not even very exotic compared to the anthropologists who became OSS officers.

However, vast numbers of academics became involved in engineering, of which the engineering of computers and software was only one instance. They became accustomed to the idea of spending comparatively vast sums of money, and building elaborate apparatus. However, if they changed their occupation, they preserved much of their academic orientation (see Andrew Hodges, for Alan Turing at Bletchley Park).

It was quite possible to penetrate into the very depths of engineering without losing one's liberal arts orientation. Arthur Burks was a mathematician and physicist before he was a philosopher. When he got his Ph.D. in Philosophy, in 1941, no employment was in immediate sight, and the Second World War was obviously about to begin. So, reverting back to his undergraduate credentials, he applied to a summer training program at the Moore School of the University of Pennsylvania. As he explained afterwards:

"The war, of course, was raging in Europe and so I thought that I would be better able to contribute to the war effort by getting this training in engineering. The idea of that course was that it would take a person who had a bachelor's degree in physics and math and make that person into somewhat of an engineer." (BAB OH 75, p.8)

This course, and additional night schools during the war years, made him into an electrical engineer. In the fall, they had him teaching quiz sections of similar courses (ibid, p. 11)

In December 1941, he moved into his first actual engineering project. The navy was developing a coil which could be mounted in an airplane to trigger German magnetic mines. Burks and John Mauchley, were assigned to do a series of mathematical calculations of the coil's power. When that project finished up, he worked on radio antennas (ibid, p. 12,15-16).

In 1943, he was assigned to work on ENIAC. Now, he worked, in effect, as one of J. Presper Eckert's apprentices, being trained on the job as an electronic circuit designer (ibid, p. 27-34). In the process, he became one of the few computer experts in circulation.

During his extended residence in Philadelphia, Arthur Burks had become acquainted with the University of Pennsylvania philosopher Glen Morrow, and they talked about Plato at lunch, off and on. Morrow was a specialist in Plato [verify this], apparently in the economic dimensions. (OH 75, p. 66).

At the end of the war Aberdeen Proving Ground offered Burks a job, and the Moore school matched the offer on the spot. When

Burks expressed a desired to get back into philosophy, Dean Pender of the Moore school negotiated with Glen Morrow, and Morrow attempted to set up a joint appointment, This came to nothing, however. Even though Morrow was the dean of the liberal arts college, the rest of the Philosophy department would not agree. Burks then did an aggressive job search, that is, sending out query letters to strangers in the modern fashion, instead of relying on friendly connections, as was the norm then. He sent out fifty queries, covering practically all possibilities. He got job offers at Swarthmore (where he already had a part-time "visitor" teaching job) and at Michigan (where he had gotten his Ph.D.). He accepted the offer at Michigan, beginning in fall, 1946 (ibid, p.66-67, 75; "A Philosophical Computer Man," Datamation, Dec. 1977, p. 32).

The computer people did not take this as the last word, however. Von Neumann and Goldstine got him an offer of a permanent position at Princeton, however, this was not a joint appointment. Given the politics that was obviously impossible. Eckert and Mauchley also made an offer of a job in their new company. The emerging computer establishment simply did not have any philosophy positions in its gift, and even though it was quite willing to allow Burks time to work on philosophy, the computer establishment could not come up with philosophical colleagues. However, the computer establishment did the next best thing. In 1948, Burks was offered a consulting contract with Burroughs, on a one-day-a-week basis, as well as summers. Burroughs was in Detroit then, so Burks could commute from Ann Arbor by bus (ibid, pp. 89-90, 102-104).

The end of the war left Burks back where he had started, in the philosophy department at Michigan. However, he now had engineering skills and industrial connections. Admittedly, Burks was a somewhat exceptional case, but similar things were commonly happening to mathematicians.

Mathematicians commonly went into industrial calculation of one kind or another. George Forsythe did meteorology in the military, and Alexandra Forsythe worked at Douglass Aircraft doing aerodynamic calculation (BAB OH 17, p. 4-8). Their classmate and eventual colleague, John Herriot, was at Ames Aeronautical Laboratory, as he put it, "doing sort of applied research in theoretical aerodynamics" (BAB OH 21, p. 3-4). The people doing this kind of work might have a business tabulator machine if they were lucky, and a bunch of ordinary clerks operating adding machines if they were not. In either case, the mathematical calculations had to be translated into simply arithmetic which the people or the machines could handle. This necessary translation bordered on being computer programming.

When the war ended, George Forsythe had offers from Brown University, where he had gotten his Ph.D., and Boeing. A major reason for choosing Boeing was that his wife had been the victim of sex-discrimination on the part of Brown's dean, and was unhappy about the idea of going back to Brown. So they went to Seattle instead. It took about a year or two for Forsythe to become homesick for academia. In 1947, he moved to UCLA, where he had done some of his wartime work (BAB OH 17, p. 9).

Once he was at UCLA, Forsythe became involved with the SWAC

computer which the Bureau of Standards was building on the UCLA campus. He remained there for ten years, until the Bureau of Standards got itself into political difficulties and had to retrench. At that point, in 1957, he moved on to Stanford (ibid, pp. 10-14).

If Forsythe was not back where he had started, he was back where he had been in 1941, on his first teaching job. The difference was that he was now an applied mathematician instead of a pure mathematician. He joined his old friend John Herriot, who had, since 1952, been dusting off his wartime computing skills (BAB OH 21, p. 4-6).

Burks, and Forsythe, and Herriot had all moved in the same direction, but they were all about the same age-- just old enough to have Ph.D.'s on the eve of war. The effect on a younger man was more drastic.

Marvin Stein, the UCLA freshman, was in the army at the end of 1942. He was assigned to the signal corps, and the signal corps was using tabulators for storekeeping. Stein was sent to the local IBM office to be trained as a keypunch operator (really, a kind of typist). He talked his way into a more advanced course which was being offered, and had become the instructor's ad hoc teaching assistant within the week. When Stein got back to the army, his colonel, a reserve officer, allowed him to run the installation on the basis of sheer ability, even though he was a mere private-first-class. The NCO's had apparently not done very well in the school they had been sent to (Stein does not say what kinds of NCO's they were) (BAB OH 90, p. 13).

At the end of the war, Stein went back to UCLA, completed his undergraduate degree in 1947, and entered graduate school with a teaching assistantship. When the National Bureau of Standards SWAC center started up, Stein was given a fellowship associated with it, and became involved in numerical analysis, or applied mathematics. After he had gotten his Ph.D., the university, unable to pay him a living wage, found him a job at Convair. Convair bought a powerful new computer from Engineering Research Associates (Univac), and the machine's teething troubles brought Stein into contact with the ERA engineering staff, based in Minneapolis. They gave and/or got him consulting work. In 1955, Univac decided to make the University of Minnesota a present of a block of computer time, 400 hours (annually?), and introduced Stein as a suitable person to take charge of this allocation, run programming courses, etc. (ibid, p. 13-16).

Stein had been looking for an academic position while he was at Convair. As he later explained it:

It was probably psychological. In those days, I believe, the professors used to brainwash the students. They said the good students will become the professors and the ordinary students will be out there working in industry. Consequently, when I found myself working in industry, I had in my mind the stigma of being an ordinary student. When an opportunity came for an academic position, I said, this is what I was educated for and I can always return to industry; so I will try it to see what I can make of it. (ibid, p. 16)

As we have seen, archetypal corporate engineers were impervious to this kind of brainwashing, if that is what it was. However, archetypal corporate engineers did not usually take Bertrand Russell as their hero in their freshman year of college.

With such imperfect machines, it was natural that their users should spend a lot of time thinking about more perfect machines, and what could be done with them.