Louis Couffignal

Born 1902, died 1966; French computer pioneer who designed and attempted to construct an early innovative system.

Education: DSc, mathematical sciences, University of Paris, 1938.

Couffignal's career began in secondary school education, teaching mathematics and mechanics at the Ecole des Élèves Ingenieurs Mecaniciens, belonging to the Ecole Navale de Brest. At that time the wisdom of providing schools with calculating machines was being debated in the French scientific journals; the arguments for and against put forward by the opposing sides remind one of those used more recently concerning the place of computer science in secondary education. Interested in the problems of calculation, Couffignal decided to write a thesis on the subject, under M. d'Ocagne's supervision. This was the first time that the theory of calculating machines had been proposed as the subject of a doctorate thesis in mathematical sciences in the University of Paris; the thesis was submitted in March 1938 and was greeted by d'Ocagne as the start of a new line of research that promised "consequences with a breadth of scope one could not yet assess."

After d'Ocagne's death in September 1938, Couffignal, an established expert in numerical calculation, was to take on greater responsibilities. He had applied for the chair of applied mathematics at the Conservatoire National des Arts et Metiers, but had been ranked second, after A. Saint-Lague, by the Academie des Sciences.

However, the course of events was to favor Couffignal. After the Munich agreement, it became steadily clearer that war was approaching; mobilization of scientific, technical, and industrial resources was begun and the plans of the Centre National de la Recherche Scientifique Appliquée (CNRSA) started to be put into effect in October 1938.[1] Henri Laugier, director of CNRSA, asked a number of leading individuals to draw up a report on the state of research and the resources available in various fields. Couffignal was asked to report on the application of mathematics to scientific and technical research, and this marked the beginning of his administrative career.

One of Couffignal's hopes was that he would be able to build a calculating machine of his own design. He had become secretary of CNRS's specialist committees, secretary general of the CNRSA committee dealing with inventions, and was appointed director of the laboratory for calculation and mechanics in the Institut Poincaré, where he found himself alongside laboratories in which there was a certain amount of calculating machinery and some computing staff. He had the task of organizing his laboratory.

Couffignal was to find his plans held up by the events of the start of the war and the occupation of France, especially as it seemed for a time that the survival of the CNRS, which had replaced CNRSA in 1939, was threatened by the attitude of the Vichy government. Couffignal collaborated with the new director of CNRS, suggesting that the Inventions Committee should be disbanded as it had failed to achieve its objectives—in his view, because of the opposition of the ministers for the various armed services and boycotting by the CNRS

[1] The CNRSA was established in 1938 to consolidate all sources of funding for scientific research. In October 1939 the name of the organization was changed to Centre National de la Recherche Scientifique (CNRS), and it took on a wide range of objectives in fostering pure and applied sciences.

directorate. This committee was later replaced by the Inventions and Patents Committee, of which Couffignal became and remained secretary general. His involvement in many of the CNRS committees made it possible for him to observe what was being done in France in scientific research. He was appointed inspector general for technical education, and found time to write a book, *Histoire de la machine à Calculer*, which had the distinction of being awarded the Binoux Prize of the Academie des Sciences, usually reserved for works on the history and philosophy of science.

Building his own machine remained his ambition and thanks to his position at the heart of CNRS, he now saw a possibility of achieving it. In 1938 the Institut Poincaré's Statistical Laboratory, directed by Borel and Frechet, had obtained a grant of FF 100,000 for the construction of a calculating machine that was to work in binary, and had gone as far as signing a contract with the Outillage R.B.V. Company to produce an electromechanical device comprising an Ellis-type adder and two converters, binary/decimal and decimal/binary. In December 1939 General Desmazieres, who had recently assumed responsibility for artillery tables, suggested to Couffignal that he should turn his laboratory into a center for artillery calculations and should equip it with a powerful machine. At that time Couffignal had arranged a contract, also with Outillage R.B.V., worth FF 80,000, for the construction of an electromechanical linking of a Sanders-Octoplex 10-column accounting machine to a Monroe A-1-213 calculating machine. This link was to enable any number produced by either machine to be transferred to the keyboard of the other, and all operations would be controlled automatically by means of a perforated tape.

The events of the war delayed the fulfilling of these contracts; further, the board of Outillage R.B.V., most of whom were Jewish, was disbanded and it was not until the beginning of 1942 that a new board was constituted. With the advance of the German armies some of the company's machines were scattered and some were seized by the occupying forces. The new management told Couffignal that they would not be able to fulfill the 1938 and 1939 contracts because there was no possibility of acquiring a Monroe machine, and in the course of these discussions an idea developed: why not combine the two projects into a single new one? For the same total sum, FF 180,000, the company would build a machine of the Sanders type and add to it a “calculating mechanism” working in binary. To make this possible, the statistical laboratory would have to give up its grant and Couffignal. set about persuading its director, Frechet, of the virtue of this idea. After some procrastination Frechet agreed, subject to certain conditions that he presented to Jacob, the director of CNRS: he would transfer his grant of FF 100,000 to Couffignal provided that the latter guaranteed him two-thirds of the time to be under the sole control of the statistical laboratory. Frechet insisted on a rigorous accounting of the machine's working time.

Couffignal was a member of the committee for Mechanics and Applied Mathematics; in the autumn of 1944, at the suggestion of Dautry, the Minister of Reconstruction, this committee began discussion of the formation within CNRS of a foundation to be called the Centre d'Etudes Superieures en Mecanique (CEMA) whose capital would be in the form of government stock and shares in national industries, SNCF for example. The latter would be able to call on the foundation to undertake various investigations or to provide training for young recruits. In November 1944 the view was formed that computing services should form the kernel of CEMA and accordingly Couffignal was asked by the Mathematics Committee to make a survey of the tables of numerical functions available in France. At the same time he kept in touch with the activities of a scientific mission to Germany in so far as these concerned bringing back machinery for calculation. Awareness of this mission's activities led many laboratories to put in requests for calculating machines, and also for slide rules that could not be bought in France; CNRS was swamped with demands and was unable to satisfy all of them.

Couffignal again saw a possibility of building his own machine; these aspirations led to the regrouping which was to give birth to the Institut Blaise Pascal. Couffignal obtained the grants he needed for the building of his machine, and at a meeting of the CNRS board on May 6, 1947, Peres proposed that a contract should be drawn up with the Logabax Company for the design and construction of a universal computing machine.

The sequel is well known in France: the machine was never finished. Meanwhile the mechanical computing section of the Institut Blaise Pascal performed calculations for scientists, using the classical methods of the interwar years. When the first commercially produced computers appeared, priorities began to change, the emphasis going to training in programming electronic computers. In 1957 a decision of the director of CNRS abolished the post occupied by Couffignal at the Institut Blaise Pascal; the man who in 1938 had been heralded as the one who would revolutionize the subject of automatic computation was removed from the field unnoticed.

Couffignal's unvarying aim was to reorganize, on rational scientific lines, the computing bureaus that were operating up to the start of World War II. He felt that one of the first uses of his machine should be to automate the accounting processes for postal checks. He always envisioned a computer center as a laboratory for constructing tables, nomograms, and charts to be used as aids for rapid approximate calculation, “useful calculations” in his definition. Conditioned by this outlook, he always believed that the real problem was interconnecting classical machines: he never understood that the speeds made possible by the new electronic machines changed the problem of automatic calculation completely.

Might this be attributed to a certain French insularity? It is difficult to answer that question. Certainly in Couffignal's case there were gaps in his mathematical awareness. In 1938, he published a note in *Comptes-Rendus* claiming that he had designed a machine for proving theorems in logic; the consequences of the famous Gödel Theorem (1931) seem never to have crossed his mind, and he made no reference to the “Turing Machine” of 1936. This contrasts strongly with his usual practice of claiming priority, that he had had the same idea earlier, without giving any details of his work.

The seriousness of the decision to entrust Couffignal with the task of building an electronic computer is shown by its consequences. As scientific activities expanded, the need for computers became ever more pressing; in the face of this rising demand the decision taken was to wait for Couffignal's machine, and when the failure of that project became evident those with the needs turned to commercial products, and especially to foreign manufacturers. Precious time for training and education in computer techniques had been lost.

A last point needs to be mentioned. The decision to build the machine seems to have been based more on Couffignal's reputation than on any rational evaluation of his project. Further, there was no regular monitoring of progress, which would have shown that it was running into the sands, and consequently the decision to halt it in time to minimize the damage was not taken. This problem of project evaluation is still with us. Whoever is entrusted with the decision must pronounce equally on the skills needed for carrying out the project. As we have noted, the necessary expertise in electronics was, effectively, available in France at this time; should not the first course have been to approach those who held this expertise? The point to make here is that the history of this project raises the question, “to what extent did its failure give rise to a kind of mutual distrust between research workers and engineers, between research and industrial laboratories?” No doubt those who lived through the events will have an answer to the question.[1]

[1] 36Extracted from Rammmi 1989.

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UPDATES

Portrait added (MRW, 2012)