Logic and Computing in France: A Progressive Convergence

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A previous paper proposed a historical model to analyze the early development of computer science in universities [1]. In all the local cases it described, computer science stemmed out of numerical analysis. Computing appeared as an ancillary technique of applied mathematics until the early 1960s, when a cross-fertilization process began. Different intellectual and socio-political agenda then converged around this "boundary object", the computer, hybridizing into a new "science" (arguably) and institutionally into a new discipline : Computer science or *informatique*. The present paper will focus on two such agenda : Mathematical logic and machine translation, in the French post-war environment.

What role played mathematical logic in the emergence of computing? The recent discovery of a volume of technical reports, written in 1950-1952 by the designers of France's first computer at Société d'Electronique et d'Automatique, sheds light on the local reception of the works published by von Neumann, Wilkes, and Turing. While the first two were highly influential, the latter was only known and understood by a young mathematician who reflected on programming methods for the machine. This junior thinker defined the computer as an information machine ; and suggested to launch research on alternative architectures, which became a veritable R&D program for the company in the following decade [2].

This early awareness must be set in contrast with the near-absence of mathematical logic on the broader French academic scene at that time, and its remoteness from the culture of computer users or designers. For example when a Swedish scholar, Lars Löfgren, presented at the Conference on Automation (Paris, CNAM, 1956) a survey of the theories of automata and computability, carefully written to address the concerns of electronic engineers [3], he awoke no echo in France. Only in the following years did a few young French mathematicians "discover" the theory of recursive functions and the Turing machine, and started sharing these esoteric concepts with computer experts.

While advances in logic responded initially to fundamental queries, the machine translation projects which emerged in the 1950s were motivated mainly by practical concerns: How could scientists keep up with the growing flow of publications in different languages ? And, even more vital during the Cold War, how could the West gather intelligence on scientific and technical efforts carried in the Soviet block (and vice-versa) ? Electronic brains might provide a solution, both as documentary systems and as fast translators. Starting with a few ideas and experiments across the Atlantic from 1946 on, research on machine translation came to mobilize by 1961 some thirty teams and 4 to 6 million dollars worldwide.

In France, two laboratories were created

in 1959, jointly by the Defense and the CNRS: One in Paris, headed by a military engineer, the other at the university of Grenoble, headed by astronomer Bernard Vauquois who had read Turing's papers and participated in the Algol committee. Both labs were optimistic about the feasability of mass-produced translation by the mid-1960s. Both came under severe criticism by linguists who objected that automatizing the translation process required basic research in linguistics before yielding any convincing practical result. Yet the reflexions on machine translation and documentary informatics were decisive in bringing formal linguistics and experience in non-numerical computing into the new discipline.

References

[1] P. Mounier-Kuhn, "Computer Science in French Universities: Early Entrants and Latecomers", *Information & Culture: A Journal of History*, 47(4), 2012, pp. 414-456.

[2] Cl. Lepage, *Quelques idées nouvelles en matière de machines arithmétiques : machines à microprogrammes, machines complètement arythmiques*, 19 June 1952, CL/DB, Note interne SEA 9M12.

[3] L. Löfgren, "Automata of High Complexity and Methods of Increasing their Reliability by Redundancy", *Information and Control*, 1(2), 1958, pp. 127-147; and *Actes du Congrès international de l'Automatique*, Bruxelles, Presses Académiques Européennes, 1959, pp. 34-42.