Crown jewel computers : On the Schickard-Pascal “*Prioritätsstreit*”.

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Abstract

Early history of computing and national interests – An essay.
(Including translations of Rene Taton’s work.)

Without going as far as to say that Rene Taton's treatment of Pascal is akin to the histories given to rulers before official visits (e.g. the history of Chinese civilization and science offered to the Queen of England), his work does represent a certain state of the history of computing.

The controversies occurred at a time when Schickard's letters to Kepler had just been uncovered prompting a small revolution in historiography (late 50's).

"[Their] discovery has opened the issue of the origins of computing", Taton admitted himself.

German scholars were now declaring Schickard as the certain inventor of the first mechanical computer relegating Pascal and the Pascaline, and with it French science, to a secondary position.

"C'était pas Pascal, mais le professeur de Tuebingen qui a invente la machine a calculs"! (trans.) ["Not Pascal but Schickard, the Professor of Tuebingen, invented the computing machine" (trans.)]

— wrote one of them.

In other words, the predecessor of the modern, electronic computer – if not its origins – had been shifted and were hitherto to be found in Germany.

What Zuse is to the 20th c. and the history of computer science, Schickard was now for the 17th and early computing history.

It is no doubt in this context that Taton's vigorous re-appreciation of Pascal in his 1963 article (translated here) should be considered; coinciding with the publication of the second edition of his treatise on early computing¹.

this astronomer can not be considered the true inventor of the calculating machine

And elsewhere :

... even though soon recognized as an astronomer of some talent, his work remains of limited importance

In "On the invention of mechanical arithmetic", he still left room for error conceding that more documents may be needed.

His book *Histoire du calcul* offers more insights. The introduction made clear that computations (and algorithms) had now permeated the entirety of society, but the interior pages reserved Schickard and his ""calculating clock"" a single mention while Pascal's role in history was put on full display, in all of its grandeur.

completely ignored, destroyed, Schickard's clock gave way to the addition-machine of Pascal in 1642.

And, was it not in this book – it was – that Taton went as far as putting Pascal in the same ranks as Shakespeare and Goethe...²

A triple alliance remained better than German hegemony.

How long until new letters are discovered: Russia or China, next? The history of computing would not be complete without its *own* history...

¹*Le calcul mecanique* ("Que Sais-Je?", PUF)

²P. 7.

"Even in a clear mind there are shadows. And, inside of us the 18th century continues to live a silent life" Bachelard wrote in one of the pages of *The Formation of the scientific mind*.

Inside of these scholars, the second world war still raged on. And, perhaps the Franco-Prussian ones too.

These scholarly debates and disputes – now detached from us by the necessary historical distance (to say nothing of personal affiliations) – appear more and more as fights fought on some theoretical 'front'.

In Pascal's engineering papers we find the unmistakable marks of the scientist who conducts their science as if part of some literary salon, constantly addressing the reader with "Mon cher lecteur" – as he did. Descriptions of his Pascaline included.

¹

Our current understanding of Pascal reveals a man greatly concerned with patents, which he did end up obtaining after some uphill battles, and money.

No pious, and world-remote thinker this Pascal!

In that way he does prefigure our modern computer scientists — Many of them carry on double employments, in academia and the private sector (sometimes simultaneously), or own investments in companies that are in conflict with what should be their neutral science.²

Financial interests are never far away from science as are national ones.

¹For an English trans. : Smith's "Source book" of mathematics.

²(see our previous research)

Rene Taton. 1963.

"ON THE INVENTION OF MECHANICAL ARITHMETIC"

Revue d'histoire des sciences

All the while participating brilliantly ["avec éclat"] in geometrical progress, calculus ["calcul infinitesimal"] and physics, Blaise Pascal was also the author of an innovative work in the field of applied sciences.

Due to the genius of his realizations, the care given to its implementation, and propagation efforts, his famous machine for arithmetic now strikes as one of the first examples of science applied directly to solve common problems and the point of origin of many subsequent inventions and updates – out of which the mechanical calculators or modern electronic ones emerged.

An important place must be reserved for this invention in the full oeuvre of Pascal's science.

(...)

The history of science shows that most great discoveries emerged as the work – not of an isolated genius but a collective of researchers, and rendered possible by the entirety of progress (...)

Certain authors were mistaken in thinking that Pascal's invention escaped this rule (...) More nuanced conclusions – taking nothing away from the creative genius of this young scientist – are reached by putting back his work inside of the global context of scientific and technical evolution [of the time].

(...)

We thought for a long time that Pascal had been the first to deal with the various questions of the mechanization of the four fundamental operations of arithmetics that are : addition, subtraction, multiplication and division.

In fact, a recent discovery has revealed that a University of Tuebingen professor, Wilhem Schickard (1592-1635), mostly known as an astronomer during this time, had come before him.

Schickard had been appointed as professor of oriental languages at the University in 1619, but far from limiting himself to questions [and finer points] of linguistics and philology, his curiosity turned toward the exact sciences [”sciences exactes”], astronomy especially.

In 1631 he became chair of mathematics and astronomy at the same University (...)

In contact with Kepler as early as 1617, he then started exchanges with various well-known German, Italian, Dutch and French scholars (...)

It was in a letter from September 20th 1623 that Schickard told Kepler of his invention for the first time, a machine featuring cogwheels [trans. note : e.g. with ’teeths’] which, he wrote, ”starting from a given number is able to do computations in an instantaneous manner, addition, subtraction, multiplication and division”. In a letter from February 25th 1624 he gave Kepler a somewhat precise description and provided a summary drawing. But his own exemplary of the machine had been destroyed in a fire, his later correspondence never mentioned it again.

As such, it is probable that not having understood the theoretical and practical importance of his invention, discouraged by bad luck, and drawn to other activities, Schickard had thus abandoned his research.

Kepler too seemed to have not felt the relevancy of this invention and it seems kept no recollections of it.

Schickard’s letter from February was recently discovered in Pulkovo and published by F. Hammer together with some notes meant for the constructor of his machine (...)

However, it seems to us that this can not be used to conclude any influence of Schickard on Pascal nor to consider the astronomer of Tuebingen as the real [”veritable”] creator of the arithmetic machine.

(...)

The fact that Schickard never replaced his machine is disconcerting and may point to some [deeper] technical flaws.

(...)

As such, considering the current state of this issue, it appears legitimate to us to view Schickard as the principal precursor of mechanical computation [”calcul mecanique”], but not as the inventor of the computer / computing machine.

An invention can only be authenticated if enough witnesses of good standing [”dignes de foi”] have seen it, then was released to the world and put to use.

Such is not the case when it comes to the machine of Schickard. (...) But the adding-machine of Pascal [did fulfill all of those criteria and] influenced most of subsequent machines.

There is no doubt that Pascal’s adding-machine is at the origin of the modern calculator.

(...)

The history of the theory and engineering of Pascal’s adding-machine remains complicated to establish in detail. It comes to us rather only in the form of two documents : the *Letter to Monseigneur le Chancelier...* and *Recommendation to all those who may have the curiosity to see the arithmetic machine* published in 1645.

Pascal himself points out that, from a purely theoretical point of view, it was in 1640 that he had started considering the difficult problem of the mechanization of computation.

[Trans. note : a discussion of various implementations follows, as well as

commercial and legal aspects, and techniques e.g. subtraction by complements.]

(...)

Many inventors followed in the path thus opened. In 1672, Leibniz (...)

Sure, Schickard had demonstrated before Pascal that the operations of arithmetic could be mechanized [/ automated] and that the cogwheel [wheel with teeth] could play an essential role;

But it was Pascal who the first made clear [”precisa”] the principles of mechanical computation and illuminated the general structure of arithmetic machines, meanwhile also triumphing against the difficult technical obstacles (...)

While less brilliant than first thought (...) it remains a remarkable accomplishment inside the oeuvre of one of the great representatives of 17th century French science.

Trans. note :

Footnotes are available in the original. An appendix follows the ending.

Rene Taton. 1961.
HISTOIRE DU CALCUL.

The modern man lives in a world of numbers. Be it commercial exchanges, income, tax or insurance, time and temperatures, the lottery or wavelengths, at every moment numbers permeate his existence. And, so, this man now regularly operates calculations not too long ago only left to the learned specialist. This vulgarization of numerical computation is the ending point of a slow evolution to which various peoples have participated since the beginning of the historical period.

Long limited to arithmetic and algebra, it took a considerable turn in the 17th c. with the emergence of differential calculus...

(...)

A genius thinker, brilliant writer, Blaise Pascal (1623-1662) was also a talented mathematician and physicist. At 16 he put down his first discoveries in *Essay pour les coniques*. In 1642 he invented the first computing machine [”machine a calculer”] and, with Fermat, created (the field of) probabilities.

(...)

computing machines, depending on their functions, take on the names of addition-, multiplying- or mixed-machines.

Following the calculating clock of Shickard (1663), soon destroyed and entirely ignored, a machine for additions was constructed by Pascal (...) Leibniz invented a multiplying-machine. (...)