accidental factors that they cannot be seized upon by calculations. A calculation could not indeed reach the minute detail of combinations when they are so varied, and when they multiply and involve complication beyond a certain level.

When our famous Morgagni, with all the power of his genius, equally able to collate facts and to deduce from them the most accurate and judicious conclusions, said: *Non numerandae sed perpendendae observationes*, one should not count, but rather weigh the facts, he energetically expressed one of the most important conditions attached to the theory of calculation of numerical probabilities applied to medicine.

This being said, is it because the inflexibility of the calculation and the apparent strictness of figures cannot be applied in an absolute manner to medicine, that our science does not even so possess a series of probabilities that can be assessed? that it cannot reach a certain degree of assurance in its progress? or that there is no form of certainty to be derived from its results? Certainly not, and in this we have with us the agreement of a certain number of eminent mathematicians; the condition of medical sciences, in this respect, is no worse and no different from that of all physical and natural sciences, of jurisprudence, of moral and political sciences, and so forth.

Whenever it is not possible for the human spirit to rise to the mathematical certainty that can be found in astronomy for instance, the consequent requirements of reason are to draw analogies with what strikes the imagination and commands understanding: the logic of the facts turns to the logic of thought. Reasoning then takes on the form of a sort of calculation the result of which acquires ascendancy over our belief, precisely on account of the effect of repetition of judgements or observations. The validity of this calculation depends here, as elsewhere, on the choice of data, and then on the appropriate use of these data. And this appropriate use can only consist in the most detailed examination of the circumstances attendant on each piece of information, in the care taken to break down the information as far as possible, so that pronouncements are made on propositions of an equal degree of simplicity, and of an equal degree of evidence, and so that one guards against any partiality in favour of any particular result.

It should be added that, on almost all points, the calculation will give hardly more than what inference has already provided, and what reason alone might well have suggested.

It can clearly be seen that the main means of reaching the truth are inference, analogy, hypotheses based on facts and continually verified and corrected by new observations, and a sure sense of touch given by nature and strengthened by numerous comparisons between indications it provides and experience which guides it.

After these reflections, for which we might be tempted to apologise to the Academy, we must hasten to do Mr Civiale justice and render the appropriate tribute, that he has already on several occasions deserved and won here. Today we must say that his new work, as it stands, will have provided new evidence for the advantages that in most circumstances are attached to the substitution of an easy, simple operation presenting few dangers for another serious, alarming and painful one which until now constituted the only resource of medical art.

The commissioners invite Mr Civiale to pursue his statistical research to increase the volume of data, and to provide more circumstantial detail to make it more conclusive; at the same time, they are honoured to call for the approval of the Academy for this work.

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**Commentary: The Paris Academy of Science report on Jean Civiale’s statistical research and the 19th century background to evidence-based medicine**

J Rosser Matthews

In 1835, the Paris Academy of Science commissioned a report on the statistical research that had been conducted by the surgeon and urologist Jean Civiale (1792–1867). By collecting statistical data on a wide scale throughout Europe, Civiale argued that a new bloodless procedure for removing bladder stones, a lithotripsy, was superior to the more widely-used technique of surgically cutting to remove the stones known as a lithotomy. Although the specific therapeutic and surgical interventions that motivated the commission’s report may no longer be directly relevant to the treatment of bladder stones, the broader issues that this report engaged (namely, the cultural authority of appeals to quantitative evidence) are clearly relevant to the contemporary
medical world. For this reason, putting this report into a broader historical context illustrates the 19th-century antecedents to au courant debates concerning evidence-based medicine.

In order to situate the commission’s report historically, it is necessary to realize that, in some respects, Civiale’s work builds on research traditions that had developed in the 18th century while, in other respects, it is very culturally specific to the second quarter of the 19th century. As Ulrich Tröhler has demonstrated, the recording of successes and failures in removing bladder stones had been practiced since the beginning of the 18th century; because practitioners received more patients if they had a higher success rate, they began to list the number of their successes and failures annually in tabular form. In this respect, Civiale’s method of quantitative comparison was not fundamentally ‘new’. However, he was able to carry out his research on a much larger scale than his 18th century predecessors because of support from the French Ministry of Public Instruction. This government support illustrates how the appeal to aggregate data had now come to be seen as key method of settling questions deemed to be ‘public issues’.

By the second quarter of the 19th century, several factors had converged that gave quantitative evidence, like that espoused by Civiale, an increasingly high level of cultural cachet. This era in European history was characterized by a marked interest in the collection of numerical information about society—what the philosopher of science Ian Hacking has called the ‘avalanche of printed numbers’. Based on the work of reform-minded physicians and political economists, European nations now had at their disposal vast amounts of aggregate data about their citizenry. Also, the political upheavals associated with the French Revolution in the last decade of the 18th century had been the crucible in which modern clinical medicine was formed. In Paris, the new hospital-based methods of instruction placed an emphasis on clinical observation, autopsy, and the use of statistical data—what the French clinician P-C-A Louis famously described as the ‘numerical method’. Viewed against the backdrop of these developments, Civiale’s report could be seen as another manifestation of this larger focus on quantification to adjudicate questions of medical uncertainty.

In commenting on Civiale’s report, however, the Commission of the Academy of Science did more than speculate on whether his statistics were conclusive for the specific issue at hand; they used the report as an occasion to engage the general question of the proper role of statistical reasoning in deciding therapeutic questions. As the report noted, ‘We hasten to seize this opportunity to broach the question of the application of the calculation of probabilities to medicine ... Medicine ... has all too often sought to hitch on to ideas that are fashionable in the opinion of the day. Thus, at present, statistics are constantly applied to most of the major questions in therapeutics. Yet in this case statistics are no more than an attempt at application of calculation of probabilities. Let us try to see what opinion we should form’. Although the commission criticized applying the ‘calculus of probabilities’ to medicine for a myriad of reasons, their main concern was that the clinician (inevitably) focused on the diagnosing and on treating the individual who would present a completely unique and idiosyncratic group of symptoms. By contrast, the commissioners noted that, in statistics, ‘the first task is to lose sight of the individual seen in isolation, to consider him only as a fraction of the species. He must be stripped of his individuality so as to eliminate anything accidental that this individuality might introduce into the issue at hand’. It was this fundamental distinction (the individual versus the statistical aggregate) that caused the commission to question the applicability of the numerical method to medicine.

Ultimately, this report is historically significant primarily because it framed the issue of the role of quantification in medicine in ways that still resonate with contemporary medicine at the dawn of the 21st century. Like their 19th-century ancestors Civiale and P-C-A Louis, contemporary supporters of evidence-based medicine herald the use of quantitative methods as the way that medicine will finally be transformed into a science. By contrast, contemporary critics of this approach, like the clinician and commission reporter François Double, question the excessive reliance on such quantitative methods; they still fear that such ‘cookbook medicine’ may cause physicians to lose sight of the unique and individuating features of the patients under their care.

References


