Abacists Versus Algorists

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For several hundred years after the introduction into Europe, possibly in the beginning of the 8th century or earlier[1], of the Hindu-Arabic numera. system, there existed a controversy over its use for accounting purposesl The proponents for the new system were called Algorists and those who defended the older Roman numeral system were called Abacists. Both factions had staunch supporters and even as late as the beginning of the sixteenth century a book on mathematics[2] contained the woodcut (Fig. 1) showing Pythagoras calculating with the aid of the abacus and Boethius using Hindu-Arabic numerals "in the modern method."

The Abacists

The supporters of the Roman numeral system took their name from the abacus, the Roman reckoning-table (tabula logictica). The abacus was an improvement on the Greek "abax" (board) and is thought to have been a development of the Semitic "abag" (sand), a counting device still in use in Oriental countries. The abag was a board covered with sand and marked with a stick for finger-counting type calculations. The Greek abax, attributed to Pythagoras (c. 530 B.C.), was a board on which calculations were made by building piles of pebbles within lined columns. The Roman improvement, first mentioned in the writings of Polybius, the 2nd century B.C. mathematician, replaced the columns for pebble-counting with grooves in which pebbles were manipulated to indicate the quantity of each nu-

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[1] In 711 A.D. the Arabs invaded the Spanish Peninsula and may have brought the Hindu-Arabic numeral system to Europe.

[2] Gregorius Reisch, *Margarita Philosophica* (Freiburg, 1503), p. 36.

FIG. 1. Algorists vs. Abacists.

meral[3]. The abacus was arranged basically as shown below, except that additional columns were used for fractions and the notations were in apices,[4] a set of mathematical symbols representing the Roman numerals (Fig. 2).

The operation of the abacus was ingenious in its simplicity. Each marker in the top slots, when moved down, represents five of the designated unit. Those in the lower slot represent one unit each and are moved towards the top to count. The number represented in Fig. 2 is 1 **M** (10,000), 4 **D** (4,000), 6 **C** (600), 1 **L** (50), 2 **X** (20), 2 **V** (10), and 8 **I** (8) or 14, 688. The abacus could be used for addition, subtraction and multiplication but not for

[3] James Gow, *History of Greek Mathematics* (Cambridge University Press), pp. 22–30.

[4] The apices appearing on the Roman abacus to represent the Roman numerals have a definite similarity to the Hindu-Arabic numerology. When the apices first appeared in Europe is in question but may well have been earlier than the 8th century A.D. A book published in the 11th century, purported to be the writings of Boethius the Greek mathematician (475 to 526 A.D.), describes the apices and their use on the abacus. If not an addition of the 11th century editor, this would place the date for the Hindu-Arab numeral system's arrival in Europe in the 5th century (Gow, *op. cit.*, p. 37).

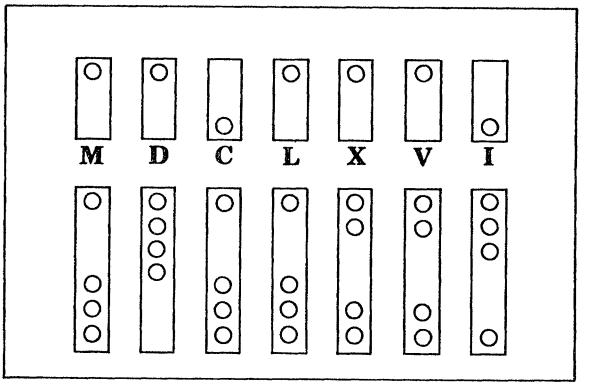

FIG. 2. Roman Abacus.

division. The Roman numerals **I**, **V**, **X** etc. were carried over to the accounting records; hence the title abacists for those who advocated their continued use and resisted the introduction of the Hindu-Arabic numeral system.

The Algorists

Algorism, the science of calculating by nine figures and zero, is generally recognized as receiving its name from Alkarismi, the most celebrated of Arabian mathematicians.[5] The philosopher, Ortega, however, believed that the name came instead from the ancient philosopher Algus, hence Algorisme for the French name of the science.[6] The Hindu-Arabic numeral system is thought to have been invented by the Hindus and transmitted to Europe by the Arabs. The earliest known examples of this system are inscribed on stone columns in India from the realm of King Aśoka (c. 250 B.C.). Others are found in caves near Poona (c. 100 B.C.) and at Nasik (c. 200 A.D.). The zero does not appear in these early examples but is included in the description of the Hindu system by the Persian mathematician al-Khowarizmi in his book of 825 A.D.[7]

The Controversy

The Hindu-Arabic numeral system, introduced into Europe in the 8th century or earlier, gained acceptance slowly despite its facility for making calculations. Charles Waldo Haskins says:[8]

The clumsy old Roman notation, which lingered along among the smaller trades-

[5] David Murray, *Chapters in the History of Bookkeeping, Accountancy and Commerical Arithmetic* (Glasgow: Jackson, Wylie & Co., 1930), p. 399.

[6] Murray, *ibid.*, p. 426.

[7] Howard Eves, *An Introduction to the History of Mathematics* (New York: Rinehart & Co., 1953), p. 19.

[8] Charles Waldo Haskins, *Business Education and Accountancy* (New York: Harper & Bros., 1904), p. 154.

> men of England, Germany and France until the end of the sixteenth century, necessitated the use of all sorts of expedients. In adding, one did not keep figures in his head as we do; he jotted down on a separate paper or parchment a number of single strokes, and then 'it was easy' we are told 'to tot up the amount.'

Objections to the accounting use of the new numeral system centered around the claim that it was highly susceptible to fraud. It was maintained that the new members could be easily changed for fraudulent purposes by adding, removing or altering a single figure. It was also maintained that the flexibility of the new system would lead to inaccuracies and errors due to less painstaking efforts on the part of the accountant. The proponents of the new system, of course, pointed out its advantages for all numerical calculations and for a flexible, readily understandable accounting system.

It is curious that these same arguments had been used centuries earlier when the Roman numerals were introduced[9] to take the place of the written out words for numbers. In addition to the fraud argument, Roman numerals were considered "unfitted for showing a sum, since names have been invented for that purpose, and it would be unreasonable to use letters with the force of words." [10] This is an appeal against change similar to the more familiar statement that if God had meant man to fly, he would have given him wings. Before we pass this off as the reasoning of a less enlightened ancient man, let us remember that today most checks and legal documents still include both the written and numbered figures.

The controversy between the Abacists and the Algorists raged for hundreds of years and was taken up in universities, governments and the courts. In the year 1399 a law was passed in Florence, Italy forbidding bankers to use the Hindu-Arabic numeral system in bookkeeping, prescribing instead the Roman figures or the written word on the grounds that the old method was safer for the recording of important sums.[11] Fifty years later, the University of Padua in Italy ordered that its books "should be price-marked; not with ciphers, but with letters." [12]

Gradually the Hindu-Arabic system won out for bookkeeping purposes. For many years, however, it was common practice to use the Hindu-Arabic numerals for calculating purposes in the bookkeeping system and to include the Roman symbols in the explanation of each entry to prevent fraudulent changes in the records. In 1590, Bartolome Salvador de Solorzano in his book, *Libro de Caxa y Manual de Cuentas de Mercadeves*, specified that the journal entry should extend cost in Arabic figures in an inner column and in Roman numerals in an outer column, thus:[13]

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[9] The earliest known numerals of the Roman type were in a Greek inscription dated 398 B.C. These were single line strokes. The signs **V**, **X**, **L**, etc. were probably added by the Etruscans and predate the beginnings of Rome. W. M. Rouse Ball, *A Short History of Mathematics* (London: Macmillan and Co., 1940), p. 126.

[10] Murray, *op. cit.*, p. 151.

[11] Murray, *ibid.*

[12] Haskins, *op. cit.*, p. 150.

[13] P. Kats, "Early History of Bookkeeping by Double Entry" (concluded), *Journal of Accountancy* (March, 1929), pp. 276–77.

(fol.)			
9 En dicho 151 mil 660 maravedis, que paque de derechos, y trayda de los dichos 14 tercios de panos, a	9	1	cli-U-Dclx

Even as late as 1652, John Collins in his book, *An Introduction to Merchants-Accomptes*, illustrated the journal entry using the Roman numerals in the narration.[14]

Roman Numerals and the Double-Entry System

One reason for accountants' interest in the Roman-Arabic numeral controversy is the part it plays in the search for the origin of the double-entry system. An argument advanced for the improbability of the use of double-entry bookkeeping by the Romans is the lack of the zero in their numeral system. It has been said that the closed system nature of double-entry accounting will not operate without the place concept of the zero. The logic of this argument is not apparent. It appears that double-entry accounting operates with any numeral system so long as debit and credit amounts can be clearly designated and their equality maintained. It is possible to express any amount of money in Roman numerals and the various sums in different parts of the accounts can be added together to arrive at consistent totals. Thus the argument clearly seems incorrect.

As further proof of the practicability of operating a double-entry system with only Roman numerals, David Murray states that "examples of books kept by double entry in the Romance language (and using Roman figures) between 1339 and 1345 have been found in Montauban, near Avignon and Catalonia (Spain)".[15] Rome may or may not have utilized double-entry bookkeeping but a deficiency of the Roman numeral system should not be accepted as evidence against its use.

Ad Infinitum

The resistance to new methods of accounting recording and reporting has a long and continuing history. The argument that change to a new system would invite fraudulent practices and decrease the accuracy of the accounting system first appeared when the use of Roman numerals supplanted the written-out numbers. The Abacists hurled the same arguments against the Algorists in the controversy that lasted for centuries over the Hindu-Arabic numeral system.

The Watt copying press was introduced in the early 16th century but for many years there was a prejudice against its use for accounting statements and documents. Even after it was finally adopted, it was customary to

[14] P. Kats, "Early History of Bookkeeping by Double Entry," *Journal of Accountancy* (February 1929), p. 208.

[15] Murray, *op. cit.*, p. 466—words in parentheses added.

preserve a handwritten copy along with the press copy.[16] The arguments presented were the same as those used by the Abacists. These same arguments were heard again in the early 1800's with the introduction of the typewriter[17] and a little later were used against its accounting development, the business machine.

When the electro-mechanical accounting system came into use in the 1920's it was resisted on the basis that records kept on punched cards would be unsatisfactory. The cards could be lost, altered or removed and new cards could be added. In addition the records of transactions were not available in readily usable form for review. Does this sound familiar? The advent of electronic data processing brought with it grave doubts on the part of accountants and auditors as to the suitability of computers for accounting purposes. The old arguments were clothed in new terminology; i.e., there were no audit trails and the system was so highly specialized that a skilled computer technician could manipulate it for fraudulent purposes without detection by even competent auditors. These have proved to be exaggerated fears.

To bring the controversy to the present day, it is likely that the "paperless society" is being delayed by the same arguments and that documents (checks, stock certificates, invoices, etc.) will continue in use for many long years after their real need has disappeared.

[16] Murray *op. cit.*, p. 340.

[17] The first recorded patent for a typewriter was taken out in England by Henry Hill in 1714. In the U.S. the typography of William Austin Bunt, patented in 1829, was the first practical writing machine (Columbia Encyclopedia (1963), p. 2188).