LUCA PACIOLI'S *ALPHABETO DIGNISSIMO ANTIQUO*
A GEOMETRICAL RECONSTRUCTION

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The authors are engaged in interdisciplinary research initiatives of the *Effediesse* Laboratory of the Politecnico di Milano and, in particular, they are interested to "contamination" projects between scientific thoughts and artistic insights. They are particularly interested in the Renaissance mathematicians that combine the classical mathematical knowledge with the humanistic culture and the artistic sensibility.

Mathematics and Art have a long historical relationship that goes as far back as the ancient Greek. It suffices to think for example to their use of the Golden Ratio, regarded as an aesthetically pleasing canon.

The Humanists of the Renaissance believed that their mission was to revive the magnificence of the classical age, such as that of Latin literature and of Roman architecture and statuary. In particular, in the first decades of the fifteenth century, elaborate lettering which resembles the ancient Roman capital letters began to appear in stone inscriptions. Later, with the discovery and the study of previously unknown ancient inscriptions and an improved historical sensitivity, many artists, craftsmen and architects demanded the lettering style to remain consistent with the classical style as much as possible.

Many Renaissance scholars thus proposed various lettering styles, associated both to a geometrical construction and to a theoretical approach. A synthesis of Mathematics, Architecture and Lettering occurs in an encyclopaedic text written by Luca Pacioli.

Luca Pacioli, born in Borgo Sansepolcro (Tuscany) in 1455, was a Mathematician, friend of the greatest artists of his time and skilful populariser of Mathematics. He published several works on Mathematics, among which the best known are *Summa de arithmetica, geometria, proportioni et proportionalità* and *De Divina Proportione*.

Between 1496 and 1498, Luca Pacioli was in Milan at the court of Ludovico Sforza, in the same time Leonardo da Vinci was in Milan. In this time he worked on *De Divina Proportione* that consists of three distinct manuscripts.

The first part, *Compendio Divina Proportione*, studies and describes the Golden Ratio from a mathematical point of view and studies polygons. The work also discusses the use of perspective by painters such as Piero della Francesca, Melozzo da Forlì and Marco Palmezzano.

The second part discusses the ideas of Vitruvius on the application of Mathematics in Architecture.

The third part, *Libellus in tres partiales tractatus divisus*, is mainly an Italian translation of Piero della Francesca's Latin writings *De quinque corporibus regularibus* (On the Five Regular Solids) and offers some mathematical examples.

The book contains illustrations based on drawings by Leonardo da Vinci. On June 1509 the first printed edition was released in Venice by Paganinus de Paganinis. The clarity of the written material and Leonardo's diagrams gave the book popularity beyond mathematical circles. Since then, the book has been reprinted several times. We can trace Leonardo's influence in some parts of the text and there is no doubt that he drew the figures which illustrate the 1509 edition: Pacioli says so more than once.

In the book we found particularly interesting examination of woodcuts in which Luca builds his *Alphabeto Dignissimo Antiquo* and we had proposals for reproducing some characters, chosen on which that reveal the nature of constructive principles. In order to better understand the geometry of the characters and the originality of the work of Pacioli, we compared his letters with those of other Renaissance authors.

We felt that this beautiful alphabet needed to be known to students and in general to non-specialists in the history of lettering. To this aim we present here an accurate replica of some letters of Pacioli's

alphabet with the program GeoGebra, following the author's original instructions which are, however, not always complete.

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