Science as ground of the Renaissance artists

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Surprisingly, at the beginning of the 15th century a new way of painting suddenly began. Differently from the elegant and graceful gothic style characterized by figures of dignified beauty living within unreal scenarios rich of precious decorations of ten of pure gold, the scenes became full of passion, of pain, of sentiments, full of life and suffused in the light of a real landscape that emphasized the bodies volume.

This new manner of painting derived from the unique environment of that historical Florentine time when free thinking was promoted along with any commercial and humanistic activity. The wealthy Florentine families, with immense fortunes accumulated through banking and mercantile activities, were encouraging artists and architects to develop new art expressions. This was potentiated through the frequent travels, that increased cultural exchanges and innovative ideas.

In this scenario mathematics and geometry were not only disciplines thought within the schools, with the main goal of growing up generations of extraordinary merchants, but also the necessary background through which smart people became able to develop the basis for scientific methodologies. An example is Paolo dal Pozzo Toscanelli, son of a wealthy merchant, graduated in Medicine in Padova, knowledgeable of the Greek language, of philosophy and of mathematics. All together this vast cultural background made him possible to propose new concepts in the fields of astronomy and geography. His research became the basis through which he discovered the move of the comets and a novel way to the East Indies, that represented the inspiration for Cristoforo Colombo to reach the American continent. Filippo Brunelleschi used his cultural background not only to build the majestic beamless cupola of the Florence dome, but also to propose for the first time on 1417 the painting in linear perspective. Probably, Filippo Brunelleschi supported Masaccio in his perspective masterpiece "*The Trinity*", a fresco terminated in 1427. Another scientist/artist was Leon Battista Alberti, a physicist for his interest to reveal the secrets of nature, but also an architect, a geometer, an arithmetician, an astronomer, a musician, a refined latinist, and an outstanding specialist of perspective, as the book *De Pictura* testimonies. Alberti holds that mathematic is the common ground of the work of both artists and scientists. Therefore, the painting rules based on perspective (that Brunelleschi discovered and Alberti settled) were founded on scientific grounds.

Figure 1 - Around 1487, Leonardo da Vinci drew the ideal human proportions following the rules described by the Roman architect Vitruvius in his treatise *De Architectura*. The perfect man is represented with his arms and legs inscribed in a circle and square (Pen and ink paper stored in the *Galleria dell'Accademia*, Venice, Italy).

Not surprisingly, all the artists, even those not educated in Latin and Greek languages, felt the need to put in writing the rules of painting, sculpturing and building. An artist like Piero della Francesca wrote a treatise on geometry and applied to the forms of his painting the same mental operations as merchants made to estimate the volume of a container. Leonardo in his treatise on painting declared that to be a good painter of nude poses one must know the anatomy of nerves, bones and muscles and also which muscle or nerve is the cause of a given movement. Otherwise, the risk is to create wooden and not graceful nudes, that seem a sack of nuts rather a human surface or a tuft of radishes rather than real muscular masses. The anatomical education and his study of the Vitruvius manuscript made possible to Leonardo that extraordinary and perfect representation of the humanism that is the Vitruvian Man (Figure 1).

For these reasons a deep revolution happened in all the arts at the beginning of the 15th century. One of the most impressive changes was the representation of the Child Jesus who until that time was represented with anatomical proportions of an adult rather than a child (Figure 2). Following the principles of perspective the painters of the 15th century began to represent children with the real proportion of the head and the other body

Figure 2 - The Gualino Madonna is a painting attributed to Italian late medieval artist Duccio di Buoninsegna (1255-1318). After 1285, tempera on wood, 157x86 cm – *Galleria Sabauda*, Turin, Italy.

parts (Figure 3). The figures were also showing the emotion and the affective relationship between the child and the mother within a real landscape in a natural light.

In conclusion, scientists and artists were acting in the same

Figure 3 - The Madonna and Child with angels, known as Lippina, is a tempera on panel of 92 cm x 63,5 cm by Filippo Lippi. The Madonna is traditionally identified with Lucrezia Buti (a nun and a lover of Lippi). The panel could be from a date as late as around 1465. *Uffizi museum*, Florence, Italy.

cultural background, developing continuous cultural exchanges, making possible that amplified and marvellous growth of arts and science, known as Renaissance. Thanks to the freedom and the search of truth, that characterized the Renaissance, Florence became in the 15th century the most important culture center worldwide.

References

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