Bülent Atalay

Math and the Mona Lisa

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Reviewed by Kim Williams

Leonardo da Vinci, in spite of the recent spate of books that has stirred the public's curiosity, remains as much of an enigma as always. We say that he was one of the world's greatest painters, but we have only a dozen or so of his paintings, of which only half may actually be of his own hand; we say that he was a great architect and engineer, yet he never built a single church or palace or bridge; we say he was a great inventor, yet the great majority of his inventions remained on paper and were found to have great flaws when their construction was attempted. Leonardo is difficult to study and grasp for at least two reasons. One is that his own interests were so all-encompassing that one must have a knowledge of many fields to take him on: painting, sculpture, architecture, mechanics, astronomy, botany, hydraulics, anatomy, optics, geology...the list is long indeed. So scholars tend to approach Leonardo from their own point of view, as a group related to Nexus approached him from an architectural point of view in 2003, or as some of the sources cited in *Math and the Mona Lisa* approached him: the surgeon Sherwin Nuland writing about Leonardo's anatomy studies, or the art historian Martin Kemp taking on the theme of his writings about painting. Leonardo reminds me of the story of the blind men and the elephant: asked to provide a description of the elephant through touch, one man feels its side and declares that the elephant is like a wall; another feels the trunk and says that an elephant is like a snake; a third feels a leg and says that an elephant is like a column. Leonardo is one big elephant.

The second reason that Leonardo is difficult to study is because one continually runs into the conflict between the man and the myth. Leonardo himself would have been the first to sell you the myth. Charismatic by nature, dependent on a noble patron for support, he necessarily and constantly promoted and nurtured his own image as a genius and man of science. When his papers and sketches began to be widely published for the first time towards the end of the nineteenth century, they were uncritically heralded as the production of genius, thus furthering the myth.

Regarding the first difficulty, Bülent Atalay is perhaps uniquely prepared to grapple with Leonardo's multiplicity of talents, for not only is he Leonardo's intellectual peer, he is his artistic peer as well, as his own drawings that appear in the book attest. Atalay thinks with both sides of his brain, as it were, as did Leonardo. Regarding the second difficulty, the man vs. the myth, Atalay skirts it for the simple reason that the real subject of this book is not Leonardo, but rather all the things that fascinated Leonardo: the wonder of science itself.

According to the book's jacket, *Math and the Mona Lisa* is intended for those whose curiosity about Leonardo's science was piqued by reading *The Da Vinci Code*, and who wish to learn more. The book certainly fulfils that wish. Dan Brown's superficial treatment of the Golden Section in *The Da Vinci Code* receives its full complement in Atalay's exposition. His purpose here is to explain—not to prove or disprove—and that he does admirably well. That the intended readership for the book is non-specialist justifies the relegation of formulae to the endnotes (though it is ironic that Atalay, who really wants to bridge the gap between the two cultures, is forced to merely acknowledge it: the plain fact is that the general public still largely shrinks from facing formulae). If this were an academic book, Atalay's explanation of the application of the Golden Section would fall short, but it is not an academic book, and conveys quite well the wonder of the value *phi*.

But Atalay's readers will really get much more than this out of the book, for the Golden Section is perhaps the least fascinating of the concepts he touches on. As the book progresses, Atalay comes closer and closer to his own field of physics, and when he leaves off discussing the science behind Leonardo and begins discussing the science that lay beyond Leonardo, the book really soars. This is where I believe that the true subject of the book is revealed, because here it is made clear that the real significance of Leonardo is not what he achieved, but the potential of his lifework, which would only be realized by many future generations of scientists.

It is the potential inherent in the 5,000 or so extant pages of Leonardo's notes and sketches that make his limitations and losses so poignant: if only Leonardo had had the benefit of a formal education; if only he had been more capable of finishing what he started; if only he had known of technologies such as the telescope or the combustion engine; if only the large part of his sketches had been preserved.

But if we leave Leonardo's potential aside and concentrate on his actual contributions, what do we find? We find often that while his incredible power of observation and sublime drawing skills rarely failed him, he often drew the wrong conclusions, such as when he correctly observed and drew the motions of a bird's wings in flight, but incorrectly applied that principle to his flying machines. Or that his sketches often contained simple yet serious flaws that Leonardo himself would have discovered had he built a prototype or even a model, such as the bicycle that has no pivot at the handlebars so that it can't be steered. One critical study of Leonardo's work in the field of mechanics was by a scholar whose pen could make or break careers: Clifford Truesdell, who minced few words in putting Leonardo in his proper place [1968].

It is ironic that the great public thinks of Leonardo first and foremost as a painter because, as Atalay points out, he was only a part-time painter: "In the hierarchy of intellectual pursuits, however, science maintained an unrivalled perch" (p. 164). This may reflect Leonardo's relentless self-promotion as well as his personal preference. In the 1400s, the mechanical arts were not highly esteemed, and were certainly less prestigious than the liberal arts. Painting, sculpture, and even architecture, were considered to be mechanical arts, and only then as subcategories of *armatura*. When Leonardo insisted that painting should not be regarded as one of the mechanical arts but rather as a science, he was not only questioning definitions of and boundaries between disciplines, but was attempting to raise the status of his own discipline as well. Leonardo's aim in his *Trattato della pittura* was to prove that painting was mental activity in order to establish it as a science. His argument was that in order for the painter to be able to recreate works of nature, he had to thoroughly understand what he was painting [cf. Clarke 1993, 127-128]; in other words, Leonardo justified his depictions of swirling water because he had undertaken scientific studies of fluids. He equally regarded his activities as architect (virtual though they were) as scientific, likening the architect to a physician:

It is necessary for doctors who are the guardians of the sick to understand what man is, what life is and what health is, and in what way a balance and harmony of those elements maintains it, and how similarly when they are out of harmony it is ruined and destroyed, and whoever has a good knowledge of the aforesaid characteristic will be better able to heal than he who is lacking in it...

The very same is required by an ailing cathedral – that is, a doctor-architect who well understands what a building is, and from what rules correct building derives, and from where such devices are drawn and into what number of parts they are divided... [Kemp 2004, 69].

The story of the science beyond Leonardo goes from one great achiever to another: from Galileo, Kepler and Newton, to Maxwell, then on to Einstein, Planck, Dirac, Born, Bohr. The message seems to be that these great minds are the vehicles by which we know what we know, and that Leonardo's great mind was in some way the first of them, the one we can grasp, and our ticket to glimpsing, if not the entirety of the results, then at least the spirit that led the great discoverers to explore.

Bülent Atalay makes of Leonardo himself a flying machine, allows us to board, then takes us on a marvelous journey through the world of science that Leonardo would have adored had he been able to see it. As with all aerial views, once we have seen the great perspective, we understand a great deal more about our everyday world. Leonardo is an ideal vehicle, and Atalay a fine pilot.

References

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KEMP, Martin. 2004. *Leonardo*. Oxford: Oxford University Press.
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About the reviewer

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