

For a New Renaissance.
Leonardo Da Vinci
As a Synthesis of Humanistic
and Technical-Scientific Culture*

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My lecture has a very challenging title. Its aim is to suggest a philosophical interpretation of Leonardo Da Vinci, in an effort to highlight how his artistic, scientific and technical work offers an image of nature and of human capable of shedding light on the problems of our times. Briefly put: I aim to demonstrate that Leonardo is not only a man of his age, the age of the Italian and European Renaissance, but a figure who has outlined a “New Renaissance” – through his works, research and reflections, spread across thousands of sheets, drawings and plans. The horizons of this “New Renaissance” transcend Italy and even Europe, touching upon transcultural problems and perspectives relevant to all civilisations and cultures in what has by now become a globalised world.

You must all be familiar with Leonardo, through pictures of his most famous works. You may have seen some of these works in museums or in the form of posters or digital images, reproduced with the aid of a remarkable technology that would no doubt have filled the artist with joy and admiration. Let us think of the *Mona Lisa*, and of her enigmatic smile. Or of the self-portrait of the sixty-year-old Leonardo, the picture of a wise old man who inspired the visage of Plato in Raphael’s painting *The School of Athens*. Or, again, of the Vitruvian Man, or the sketches of the flying machines designed by Leonardo.

As we all know, over the course of the five centuries since his death, Leonardo has been made the subject of hundreds of very different books: specialist works, more popular ones, and even fanciful if not wholly

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unfounded books. And this is not to mention the successful films inspired by *The Da Vinci Code*, presented as a magical chest containing the solution to strange enigmas and unfathomable mysteries. The Renaissance theme of the correspondence between macrocosm and microcosm is certainly to be found in Leonardo's work. However, it occurs in quite a different form from the magical-Hermetic and Neoplatonic motifs found in certain Renaissance thinkers. Leonardo clearly distanced himself from the kind of astrological tendencies that in his day were closely intertwined with the *philosophia naturalis*. Although he continued to use the term "astrology" to refer to astronomy, Leonardo mocked the then widespread belief in the influence of the stars on human affairs. As we will see, his concept of nature combines the vital and the mechanical aspects of natural processes, according to an entirely earthly and secular perspective.

A few worthy attempts notwithstanding, the reception of Leonardo's work and complex multidisciplinary legacy is still caught between two opposite tendencies: the tendency to mythicise Leonardo and the tendency to confine him to his own time, a time before the modern scientific revolution embodied by Galileo and Newton. What we have here are two misleading temptations: the meta-historical temptation (to eternalise a universal genius), and a dull historicist one (to present Leonardo as an artistic genius but also as a scientist operating within the narrow limits of his own age). Neither interpretation really grasps the dynamic potential of Leonardo's research, which transcends the mechanistic and Euclidean paradigm of modern science and metaphysics (think of Descartes), foreshadowing problems and forms of knowledge only explored by contemporary science and art.

The process of bringing together Leonardo's many scattered documents is an ongoing one. What we have today is a substantial collection of thousands of drawings and roughly six thousand sheets of notes, but these represent less than half of the material originally stored by the artist's pupil Francesco Melzi, and which had already been largely lost or destroyed by 1570 or thereabout. In any case, these are notebooks filled with drawings and annotations that touch upon a range of fields: astronomy, physics, mechanics, engineering, anatomy, architecture, hydrodynamics, botany, Earth sciences, and the philosophy of nature. As noted by my Berkeley friend and colleague Fritjof Capra (who is best known for the international success of his book *The Tao of Physics*, but who is also the author of some important works on Leonardo), an analysis of these notebooks reveals certain problems that were not solved, or even merely raised, until centuries after Leonardo's death. Well ahead of his time, Leonardo made some crucial discoveries, including: the wave-like nature of light and sound; the nature of fossils and the length of geological time

periods; the influence of sunlight on plant growth and the phenomenon of tropism; the relativity of movement and the nature of the conservation and dissipation of energy; the parabolic nature of ballistic trajectories; the distribution of air around the wings of birds; the food chain and food cycle. Particularly remarkable is his anatomical research: had his *Treatise on Anatomy* been published before the mid-16th century, which is to say before Vesalius, it would have had a huge impact, much like the research achievements just mentioned.

Later I will be focusing on certain passages from the notebooks and “Codices” that are of special philosophical relevance. However, I should note that Leonardo’s philosophy is to be found not in any explicit and fragmentary considerations, but in the power of his immanent thought, within the mutual relationship he establishes between art and science. I should recall here that in the Renaissance the two terms had a different meaning from the one they are commonly assigned nowadays. *Ars* does not refer merely to art as we understand it today, but rather to a mode of doing that combines, within a graded continuum, technical and practical, artisan dexterity (something Leonardo had acquired in the workshop of his master Verrocchio) and the aesthetically most sublime artworks. Likewise, *scientia* does not refer exclusively to scientific expertise, but to every degree of knowledge. Now, art and science are not two separate fields for Leonardo but two *practices* – the practice of crafting and that of knowing – that are not only interconnected but mutually convertible: if art means composing by knowing, science means knowing by crafting. This is not a mere synthesis or “conjunction”, a sort of “marriage” of Art and Science, but a mechanism for the reciprocal conversion of two symmetrical practices: not art *and* science, but art *as* science, and science *as* art. And both, science and art, *as* philosophy. As a genuine *philosophical practice*.

It is evident, therefore, that Leonardo’s drawings are both artworks and tools for scientific analysis. They benefited from the remarkable potential offered by a new technology that marked a real historical watershed: printing, the “Gutenberg galaxy”. As you all know, in 1455 Gutenberg printed the Bible in Mainz, and technologically reproducible books started circulating throughout Europe. Italy was at the forefront of book production at the time: just think that in the late xv century two million books were printed in Venice alone. Leonardo spearheaded the use of this new technology, as he invented a way of combining movable-type printing with engraving, which is to say with the art of printing illustrations. In one of his most famous codices, the *Codex on the Flight of Birds*, which lays the foundations of aerodynamics, Leonardo presents a new printing method to reproduce texts and drawings together. Amazingly, Leonardo

foreshadowed a technique that was only introduced in the late XVIII century by English poet William Blake (who was also a consummate engraver). However, we should not forget that Leonardo chiefly considered himself a designer and engineer. Besides, we know that as a young man he fell under the spell of the great Humanist Leon Battista Alberti: not just the *De pictura* but also the *De re aedificatoria* played a crucial part in the young Leonardo's education. Although he knew no Greek at all, and had only a limited command of Latin (he used to refer to himself as an «omo sanza lettere», or «unlettered man»), Leonardo was able to study Classical texts such as Plato's *Timaeus*, Aristotle's *Physics*, Ovid's *Metamorphoses* in Italian translations, and the *De rerum natura* of Lucretius (rediscovered by Poggio Bracciolini and reached Leonardo through excerpts from some parts, or participating in Florence in 1475 in the lectures of Lorenzo Bonincontri). Compendia also enabled him to become acquainted with the writings of Pythagoras, Archimedes, and Euclid. Still, by contrast to many Humanists of his day, Leonardo believed that knowledge only came from experience, and not from the authority of great men of the past. In many ways, this is an attitude he shared with Niccolò Machiavelli. It is hardly a coincidence that Leonardo probably met Machiavelli on the 30th of July 1502 at Urbino, before being appointed "general engineer" by Cesare Borgia – that is, the famous figure of "Valentino", who was to feature prominently in Machiavelli's *Principe*. No less significant is the fact that, the following year, it was once again Machiavelli who put Leonardo in touch with Pier Soderini, the "Gonfaloniere perpetuo" (the "Perpetual Standard-bearer") of the Republic of Florence, for a river engineering project, but also for the cartoon for *The Battle of Angbiari*. This was commissioned by the Republic and intended to be transposed as a fresco on one of the two walls of the Sala del Maggior Consiglio in the Palazzo Vecchio (for the other wall, Michelangelo was asked to paint a fresco of the Battle of Cascina).

For Leonardo as much as for Machiavelli, then, it is experience – not reference to past authorities – that constitutes the primary source of knowledge about reality. Leonardo is harshly critical of those sciences which «start and end in the mind». This is not to say that geometrical and mathematical abstraction, taken in their formal autonomy, are useless. On the contrary, they are essential in order to discover the *reasons* behind phenomena, and to set these coherently in relation to their effects. However, insofar as nature presents us with a constant interplay of *mechanical* regularities and *vital* dynamics, it is necessary to resort to a different kind of geometry and mathematics: one far more complex than Euclidean geometry and the equations of Newtonian physics. Therefore, the picture of the world outlined by Leonardo requires a

qualitative mathematics (what in the technical jargon is known as non-linear dynamics) and a *topological spatiality* (that is to say, a geometry of forms in movement). In his mathematical studies on “transmutations”, Leonardo seems to be experimenting with an embryonic form of topology, which anticipates by four centuries the important branch of modern mathematics developed by Henri Poincaré in the early 20th century. Driven by these insights, Leonardo carried out his remarkable – and only apparently fragmentary – investigations into the dynamic forms of nature. Here art, science, technology and philosophy are brought together in the pursuit of a new vision of the cosmos, blending beauty and destruction, harmony and disharmony, concord and discord, natural calamities and wars. As highlighted by Fritjof Capra, this is a systemic vision articulated into a range of analogical correspondences: the fluid dynamics of water and air, the geological changes of the Earth and the biodynamics of plants, the anatomical proportions of the human body and the architecture of Renaissance palaces.

These are remarkable motifs, which only became discernible after 1881, when publication of Leonardo’s notebooks began. It is striking just how a poet and thinker as Paul Valéry realised the innovative quality of these sheets, which he highlighted in his *Introduction to the Method of Leonardo Da Vinci* as early as 1894. Valéry immediately grasped the unitary thought underlying the apparently fragmentary notes – which may have been the reason why, according to Benvenuto Cellini, the King of France Francis I, who had received Leonardo at Amboise, praised him as a philosopher. With a surgeon’s eye for detail, Valéry also identified the ground-breaking objects of Leonardo’s research as «the very practice of thinking». Leonardo «was the master of faces, anatomies, machines. He knew how a smile was made». But, at the same time, «he passes from the headlong or seemingly retarded movement of the avalanche and landslide, from massive curves to multitudinous draperies; from smoke sprouting on roofs to distant tree-forms, to the vaporous beeches of the horizon; from fish to birds; from the sea glittering in the sun to birch leaves in their thousand slender mirrors; from scales and shells to the gleams that sail over gulfs; from ears and ringlets to the frozen whorls of the nautilus».

No one – Valéry says – has really grasped the rigour behind a method that allows Leonardo to «freely roaming the apparently so different fields of the artist and of the man of science», from «poetic construction» to «tangible and measurable construction».

Setting out from Valéry’s compelling pages, I now wish to introduce one last aspect of Leonardo’s thought: his overturning of the traditional hierarchy of knowledge, culminating with the *liberal arts*, and his affirmation of painting as a privileged means to know reality. Painting is

the most philosophical of all arts. But in what sense? Leonardo provides two different answers to this question, at two successive stages of his career. The first answer brings into play a crucial theme in the cultural climate of the Renaissance: the challenge between time and eternity. In the conflict between the drive towards the construction of form and the dissolving power of «consuming» time, the «predator of created things» (as we read on folio 156r of the “Arundel Codex”), painting must creatively construct a space that is immune from the destructive action of time. At a later stage, instead, Leonardo formulates his answer in very different terms: the supremacy of painting must rest in its capacity to represent the transformation of form. Here Leonardo comes up with a new invention: a new category, «the being of nothingness». This is not a form of nihilism. Leonardo is not speaking of the nothingness of being, but of its very opposite: the being of nothingness. What are we to make of this? The being of nothingness does not coincide with non-being; rather, it is that break, that gap between past and future, between the no-longer and the not-yet, which is the source of the process of transformation of historical events, as well of all changes in nature.

This kind of suspended time finds sublime artistic expression in the enigmatic smile of Mona Lisa – a smile made indecipherable precisely by the mysterious suspension of time.

I will leave you with this smile, hoping to have succeeded in giving you an idea of how Leonardo Da Vinci can help us lay the foundations of a New Renaissance: a Renaissance capable of tearing down the disciplinary boundaries between the Humanities and science, and especially the walls between different civilisations and cultures, in the name of a universalism of differences.

I thank you very much for your attention and wish you all smooth philosophical sailing at these Olympiads.