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EUROPE, INVENTOR
OF LANGUAGES
IN RENAISSANCE TIMES

For Jacqueline van Praag-Chantraine

There are, it is said nowadays, “Renaissances,” in order to emphasize the diversity of expressions in this period of civilization and because of the concern for restoring the originality of the historical situations experienced at that time by the peoples of Europe. It is true that from the fourteenth to the fifteenth centuries, the Renaissance touched many areas in order to provide a response to challenges of the times. But even though these responses were varied, the world view was the same.

However, this world view, which is nothing other than an orientation chosen from among possible solutions, is not the result

Translated by R. Scott Walker

of imitation but of an impulse extended to the most diverse manifestations. Although the aspects in which “Renaissances” appeared were infinite, all, nevertheless, issue from a watershed producing observed slopes and valleys.

And here we will attempt to retrace this watershed, which can be found in the invention of languages. It is, in fact, this watershed that provokes all that can be observed as decisive in the works of this period of civilization.

At that time there occurred the sudden maturation of dialects that were then to become national languages, fully conscious of their own resources. These languages, until then purely oral, became famous through fundamental literary works designed on the model of the Ancients, which naturally existed in writing, at exactly the same time that the printing press and its revolutionary technology was providing broad public access to the work of the moderns. But this was just a symbol. At the same time the plastic arts, architecture, painting, sculpture, theatrical and urban scenography could be seen to develop from the theory of perspective into independent languages endowed with a grammar that, despite the complexity of the subject matters, encompassed the entire system of possible forms.

Music in turn was enriched with a theory of harmony that governed compositions in an ever tighter relationship between notes and words, the effects of which have endured even to today.

And, no less surprising, the language of sciences was being formed almost simultaneously. First of all with optics, whose Euclidian seeds were brought to fruition in Alberti’s theory of perspective; in its wake appeared the notebooks of Leonardo da Vinci that fostered the development of anatomy, mechanics, ballistics, hydraulics, cartography, climatology and aerodynamics. Meanwhile, mathematics, geometry and astronomy set off on the decisive course that would lead them to that perfection of enunciation and reasoning that Descartes would make into the model of scholarly and philosophical method.

Nevertheless, this astonishing coincidence of inventions in the realm of languages, of plastic arts and music, and of sciences took place at a crucial moment in European history. Social, economic and political events set up an atmosphere of mistrust in which everything might have perished. And yet, as we know, just the

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opposite occurred; instead these inventions found therein the active reason for their development, the vital necessity for their flourishing, the inevitable authority of a style.

I. DEVELOPMENT OF NATIONAL LANGUAGES AND FUNDAMENTAL WORKS

The dissemination of languages in the West following the invasions of the sixth century had, with the break-up of the Roman Empire, become like an open sore. At that time there were only vulgar languages, not because of the supremacy of Latin, but because Latin alone assumed the functions of civilization. An instrument at the service of the ecclesiastical and legal structures, it furnished a grammar, the basis for written literature, a code open to all genres.

One linguistic event was to change this situation. A poem metamorphosed a dialect into a national language. This was, of course, Dante's *Divine Comedy*, which imposed Tuscan on the peoples of the Italian peninsula, at least on its educated classes. From that moment on Tuscan was fully capable of expressing everything that Latin had continued to lay claim to, charmingly bearing the content of feelings and of ideas. In this way Dante established the decisive power of thought over language. But this power, manifested solely by the force of the poem, announced much more than itself; it announced the continuous invention of languages whose dynamic movement the West was now to join. This movement enthralled an entire continent and would one day be called the Renaissance.

A language is borne entirely by the people who speak it, but it only acquires its full power when written literary works develop its potential to the limits of memory and thought.

In the era of oral tradition, the people as a whole achieved the invention of language. This invention was made manifest by a spontaneous flowering of verbal expressions, songs, ballads, lullabies, poems, legends and so on. Everything spoken was learned by heart and found in this an intensely animated life. Spoken language received its impetus from emotion, feelings, the will in the presence of the object of its desire, passion. When invention

was subsequently taken over by more gifted individuals—bards, keepers of legends, poets—their production was immediately placed in circulation because of its total immersion in oral tradition. We barely know the names of these poets so much do they blend together.

On the other hand, as soon as a language becomes set in writing, oral creation is no longer operative other than as a sub-category. The invention of language is directed by work on the written language, which thus becomes the work of poets and writers. However, such work on texts must appeal to comparison of collections of oral traditions, to a heightened awareness of the syntax, semantics, phonematic elements of the language. “Poetry’s task is to produce a few perfect applications of the language of a nation”, wrote Paul Valery.¹

And so we can legitimately speak of the invention of national languages at the time of the Renaissance by its poets, its grammarians and its scholars. The passage from a “shared treasury of language” to the written word is a sign of nascent maturity. A Renaissance.

By writing the *Divine Comedy* Dante provided Tuscan with means for expressing the modern condition. Petrarch and Boccaccio were also to express themselves in Tuscan, confirming this language in its contemporary features and in its marvelous capacity to engender vivid provocation. As if to buttress our interpretation, Dante himself became the theoretician of the destiny promised to the dialect, the illustration of which he undertook at the same time. In *De vulgari eloquentia* the poet produced a theory of versification. In justification for the famous hendecasyllable that would mark his entire poem, he showed that through assonant and rhythmic discourse, the poet aims for “sublimation”—in the sense that chemistry gives to this word—of the resources of language.

Amazing thing! The demonstration of semantic and grammatical “sublimation” of the word by a poem was provided for us by this famous Florentine, seven hundred years ago, when he described “this supreme art of grammatical texture for which the verses form the support.” “I am a grammarian,” said Saint-John Perse, whose

¹ Paul Valery, *Les Cahiers*, “La Pléiade,” Gallimard, 1974, 2 volumes, T. II, p. 1092.

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experience recalls that of Dante. But what is limited in the grammarian to a purely formal analysis is developed by the poet, working for himself, into research at the service of song, the sound of which is a prelude to a new world. And so an entire people recognized in Dante's poem the chosen and efficient language that was becoming its own.

But Dante's role was not limited to giving a "modern" language to his country by transmitting adventurous thoughts to contemporary horizons. He opened for European languages the paths to their own emancipation. Throughout the Renaissance, in the various European languages, there was no access to the characteristics of true literature without the formative influence of the Tuscan example. The influence of the gigantic work that is the *Divine Comedy* was to be redoubled by the astonishing fortune of the sonnet in Europe.

The origins of the latter go back to the beginnings of the *dolce stil nuovo*. Its invention by Guido Guinizelli had attracted the attention of Dante, who added to the practice a theory in which the linguistic stakes are set out with prophetic lucidity.

Petrarch was to make of the sonnet an ingenious vehicle of the changing moods of a person in love, testimony to the birth of self-awareness for which Eros is the prime mover. But this awakening of self-awareness under the pressure of desire, far from occurring in the expected order of conventional sentiments, developed despite prohibitions, under the influence of passion. A new language was to become the basis for sentiments until then unexpressed. A playful spirit and a taste for form parry with amorous lyricism hostage to time and the tearings of passion.

This sensitivity, which had an effect on both the realm of intimate life and the performances of language, raised the sonnet to the level of highest accomplishment encouraging and crowning national languages. Dante, the very first poet and theoretician of his art, reveals in the sonnet the equivalent of a linguistic Stradivarius. Italy was to discover astonishing resources in the *Vita Nuova* where Dante sets the tone. Petrarch spread the model to Europe. But if we ask ourselves about this success, we can find no other reasons than the liberation of feelings, of words and of manners for which this verbal play was the occasion.

Roman Jakobson, contrasting the sonnet with a poem of four

verses, emphasizes “this ingenious mixture of symmetry and dissymmetry and especially of binary structures at the level of relationships between verses that gave to the Italian sonnet its permanence in time and its expansion in space.”²

And yet it is necessary to ask why the refined structure of the sonnet ensured its expansion and its permanence. It is because its development touched not only the enunciatory structures of languages but also gave them the experience of their generative structures. Their careful construction made it possible to celebrate the language in which the sonnet had been crafted. Thus “the desire for art” at work in the living languages of Europe could not help but focus on this form, all the more singular in that its quite scholarly structure functioned on the basis of native forms of song, that is from a primitive and almost popular lyric inspiration. And so this very learned effect, respectful of primitive song, stamps it with a seal of origin that extends to its most refined expressions. Languages, we said, are above all expressions of the peoples who speak them. The scholar, who later develops their virtues to the highest levels, can only create a fecund *oeuvre* by pursuing the initial burst of energy. This is indicated by the lyrical source. At the beginning of a language it is the pure metal of song that the poet preserves at the summit of his exploit.

The Anacreontic poets—Virgil, Horace, Ovid, Dante, Petrarch, Boccaccio—all provide precise “objects” for the “impulse” of languages. In the Renaissance, artists reached such a degree of complicity with the ancient models that they aspired to imitate them in the vulgar language, in which there lacked only written works for accession to literary status. Whereas the habitual use of language employs utilitarian significations of words, overlooking or rejecting polysemanticism exaggerated by connotations of memory, the frequenting of the models of Antiquity on the other hand encourages writing that refers to its own history, to its memory, and which enriches expression with an intensity extended to the entire range of sonorities, rhythms and inflections. How can one not be struck by the coexistence of distinct currents that each work together toward emancipation of the vulgar language? On the one hand the humanists, influenced by translations of the Ancients, acquired a reasoned awareness of the original living language, quite

² Roman Jakobson, *Questions de linguistique*, Seuil, Paris, 1973, p. 301.

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frequently providing it with a grammar, on the other, poets produced refined works that the technique of printing extended to the public and that give the native language that affirmed literary existence of which until then only the Ancients had enjoyed the privilege.

An unknown language in a foreign land murmurs to the ears like a forest murmuring in the wind. This is the too brief moment in which we are sensitive to the musical charm of an idiom. But it is an element that restores for us hidden potential and is revealed by the lyrical compositions of the nation. The emancipation of living languages was accompanied throughout Europe by the development of a musical language in close connection with the emancipation of the Word. This phenomenon, which merits very close attention, can be observed as early as the *Duecento* in Florence. There is indeed nothing astonishing about the fact that in Tuscany a music was created that is essentially subject to enhancement of the voice, of the text and of syntax. The *dolce stil nuovo*, the *canzone*, the sonnet were harbingers of this trend. But the event went beyond scholarly circles. Popular song now stimulated the inspiration of poets and musicians. From the "Carnival Songs" of Lorenzo de Medici to the "*frottola*," a song of the masses according to the most probable meaning, from the parodic *villanella* to the madrigal influenced by sacred polyphony, it was in the fusion of sound and words that music then found its inspiration, invented its forms and subjected its instrumental discoveries.³

This inflection was ingeniously developed in Rome in the sixteenth century in the motets of Palestrina where the music draws "its fine modulations and its structural enrichment" from the text it serves. Although it is true that the operation came to life only at the end of the sixteenth century, it was indeed the fruit of an evolution that had been pursued without interruption ever since there was singing from a text and that choral studies were encouraged in the musical groups of Florence and then all of Italy, in Rome, Venice and Naples.

The appearance of opera can thus be explained as well. It fits

³ Nadie Bridgman, "La frottola et le madrigal en Italie" in *Histoire de la musique*, under the direction of Roland Manuel, Encyclopédie de la Pléiade, Paris, Gallimard, 1960, 2 tomes, t. I, p. 1090.

into the genealogic relationship of language to singing, which this new genre celebrates and continues. The art of Monteverdi was developed in continuous fidelity to the significations of spoken language; it resulted in a song full of sensitivity, variety and pathos, the recognition of which music extends to the echoes of memory. His work in the musical sphere achieves a depth of refinement and knowledge that constitute its style.

The desire of the Florentine humanists was to bring about a rebirth of tragic discourse that would speak in its lyric plaint of the destiny of man in the thrall of desire and mortality. Thus in the blend of Eros and Thanatos, they thought they would restore life to ancient tragedy. At least such was their thought, their expressed intention. Like Anteus in contact with the earth, the Italian language, allied to music as if issuing from it, rediscovered in opera an original principle of invention.

And so opera was established, a truly renascent genus by its sources, even if its development was almost immediately enriched by baroque mannerism. However, this singular artistic expression was born from the impulse of invention of language. An origin that we have forgotten, that we sometimes deny—"what, speak while singing?"—but which explains the fascination that opera holds for us still today and whatever we may think.

The origin of language resides in the sung word as Jean-Jacques Rousseau so properly demonstrated.⁴ Elevating itself to the Dionysism of an ultimate mythical vision, collective and cosmic, opera is the signature for the common Western exploit of linguistic and musical invention.

Parallel to opera and preceding it by a little, Renaissance polyphony had opened a field of experimentation in which concert compositions of classicism were to find their source. Four centuries of musical creation in Europe were produced from fecund matrices in which sound and voice are woven together. And this is too narrowly stated, since in sacred polyphony the text impels the composer to contrapuntal explorations and to the creation of musical architecture. Dazzling free experiments of Renaissance polyphony, testing the laws of harmony, were at the beginning of

⁴ Jean-Jacques Rousseau, "Essai sur l'origine des langues," in *Oeuvres complètes*, Paris, Furne, 1835, t. 3 chap. IX.

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the Western musical universe, and this fecundity has not yet been exhausted.⁵

By 1558 the Venetian Giuseppe Zarlino, composer and theoretician, had developed the theory of perfect harmony from the experiments of the masters. The musical equivalent of grammars and syntactical rules of language, the theory of harmony is based in the accord between three tones. There is an analogy of structural relationship and formal wealth with the linguistic triangle (“I,” “you,” “he”), and symmetrically with the latter, to the three terms of perspective in representing the visible world (viewpoint, optical cone, horizon), which we will explain later. This generative structure common to literary, musical, plastic and scientific languages for which Europe of the Renaissance is the “total theatre” is constructed here. This is the event whose intellectual and aesthetic importance we wish to capture through a train of thought that now leads us to painting.

II. THE LANGUAGES OF ART

The frescoes of Cimabue, termed modern by his contemporaries, appeared only a little before *The Divine Comedy*. It was the role of painters to reveal the underlying structures that sustain creation of language and to expose the foundations of linguistic formations at the inchoative level of gesture. All our discourse is preceded by rhythm, movement, mime that situate it in desire, in passion, or else in reality. More particularly we suspect a structural analogy between the poetic language of the *dolce stil nuovo* and the organization of a *Trecento* painting, so evident to the eye. Roman Jakobson confirms this intuition for us by tracing a fundamental correlation of it. “The poetry of the *dolce stil nuovo* with its complex and striking grammatical structure and, on the other hand, the plastic arts of the same period, all filled with rigid laws of geometric construction, pose the crucial and still unexplored question of the importance of the structural processes that inform the masterpieces of literature, painting and sculpture in the first

⁵ Joseph Samson, “La messe et le motet in Italie,” in *Histoire de la Musique*, *op. cit.*, t. I, pp. 1167-1191.

years of the *Trecento*.”⁶

The resurgence of ancient eurhythmics in Romanesque and then Gothic statuary, the re-adjustments similar to the structural logic of the Romans so admirably exemplified from the beginning of the *Trecento* in Tuscany by Giotto, the Pisani, Arnolfo di Cambio, as well as the scenography of medieval urban theatre required a synthesis that could recapture the imminent solutions of a rigorously reasoned stylistic imperative. However, it is precisely this procedure applied to space, according to an explicit mathematical logic, that became in the *Quattrocento* the subject of a program extended to all expressions of art. And geometric perspective, established in architecture by Brunelleschi, was to impose itself on painters, sculptors, urbanists, stage designers and, a century later, opera scenographers with all the compelling force of a book grammar. It is not incorrect to say of this grammar that it would then rule over the West for more than four hundred years.

Applying himself to the problem of perspective, “where errors were frequent,”⁷ by 1420 Brunelleschi proposed a reasoned method that made it possible to construct perspective with geometrical precision. Using an ingenious system to create the practical conditions for intersection of the visual pyramid by a vertical plane equivalent to the plane of a painting, the Florentine architect conceived the device by which he would be able to reconstruct the optical cone, “*legittimamente*,” in all its rigor.

We know that he chose the square in front of Santa Maria dei Fiori for his demonstration. There he set up a stand with a painting and a panel arranged parallel on it, one in front of the other. The panel had a small eye-hole pierced in it, and the viewer was asked to look through it. There he saw that the painting was of the baptistery, San Giovanni, with the actual baptistery structure hidden behind the painting. The painting intersected the visual pyramid that should have linked the viewer’s eye to the famous baptistery. But when the painting was then pulled away, the viewer immediately discovered the real marble monument glistening in

⁶ R. Jakobson, *op. cit.*, pp. 299-318.

⁷ Giorgio Vasari, “Brunelleschi”, trans. under the direction of André Chastel, in *La vie des meilleurs peintres, sculpteurs et architectes*, collection “Arts,” Paris, Berger-Levrault, 1983, 12 tomes, t. III.

the sun; and the theory of perspective was proven valid.⁸

But what this demonstration did not show was the number of intellectual and aesthetic problems that Brunelleschi had resolved in the “legitimate” representation of the visible. The most surprising of these was that it was produced by a graphic figuration each point of which could be justified. An entirely geometrical procedure made it possible to recreate, by calculation and by reason, a view of an open and infinite horizon.

The churches of Santo Spirito and San Lorenzo in Florence are demonstrations in stone of a geometric network, with the vertical thrust of the columns rising from the floor exalted by the leap of the arches and cupolas springing from these uplifted shafts. An optical dynamic, originating in the perspective cone, is imposed on the eye by a construction as vibrant in space as a mast pushed by the winds of an open sea.

In the Pazzi Chapel, his last work, Brunelleschi consciously set out to place the infinity of the vanishing point of mathematical perspective at the service of architectural aesthetics.

Standing inside this monument, the eye follows the play of columns and pilasters, stringcourses and arches to the focal point of the *tondi* in the four pendentives of the central cupola, a captivating ensemble of vanishing lines. The viewer finds the point located by convention at infinity, which only exists geometrically and mentally.

Brunelleschi here conceived an architecture that expresses pure geometric lyricism. The simple masses, at right angles, of ancient Rome of which the Florentine artist was the self-appointed heir, inscribed in stone the diagram of a plan drawn to the golden proportions. The ancient Platonic speculation on numbers was reborn. Each object, each element was no longer considered in the subjective and accidental relationship in which it ordinarily appeared but in a relationship depending on and suspended from intellectual activity.

Thanks to a scenography that employs the perspective vanishing point toward conventional infinity, Brunelleschi was able to find a point of balance for this poetry suspended between heaven and

⁸ Hubert Damisch, *L'origine de la perspective*, collection “Idées et recherches,” Paris, Flammarion, 1987, pp. 65-154.

earth, between concern for the mundane and a cosmic, almost sacred, viewpoint inherited from Antiquity. Because of this poetry, architecture became an “infinite task” between concrete practice, subject to the accidents of existence, and a Promethean project of unification, never abandoned and continually relaunched. Through it the path was opened for Alberti’s urbanistic ideas that reappear implicitly in so many European urban projects, from the Champs Elysées to the Newski prospect, all the way to Le Corbusier.

By confiding the method for mathematical perspective to his friend Masaccio, Brunelleschi destined painting to a role that was new in the history of civilization. The reference to geometry established by perspective obliged the painter to use it for each of his acts according to a method that anticipated the method of the sciences.

This was an exceptional moment. Perception in its newness, in its quivering naiveté, in its exuberant force, and reality in its abundance are captured in a grid controlled by calculation. It is the paradoxical and fecund union of intuition and reason that is here consummated. The exuberance of a concrete spectacle is contrasted with the regularities of a perspective grid, forcing the painter into an unending to and fro between the visible and the intellectual conception of his representation. With Masaccio, as soon as he adopted the use of perspective, Western painting, endowed with the principle for its development, entered into the uninterrupted series of experiments and discoveries that make up its rich history. This history was born of Florentine perspective, which effected a synthesis of preceding experience. It shows that the Tuscan painter, so equipped, constructed a luminous space ordered to the gesture that distributes, controls, disposes, and opens up to intelligent and courageous action.

Masaccio’s brush strokes announced in truth and with vital assurance the mechanism of perspective that Brunelleschi was to reveal to him. Thanks to this master an instinct took concrete form with geometrical inevitability. Perspective furnished Masaccio with the grammar that raises his expression to a style, that is to the authority of a language that will make it recognized by all, to the authority of a collective mnemotechnique. Indeed with Masaccio the perspective framework legitimates the greatest tactile, kinesthetic and mimetic force that painting had acquired since the

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Etruscans.⁹ And this juncture, in which the vision produced by the accumulated experience of generations intersected with the intellectual principle of its evolution, opened the challenge for four centuries of pictorial invention.

The history of Western painting can be seen as a declension of perspective's possible relationships to pictorial expression. If one seeks to determine the fecundity of these relationships, it becomes apparent that perspective played the role of a plastic grammar by guaranteeing the memory of the masterpiece in an unbroken dialogue. It is the continued invention of a single language over almost half a millennium, the constitution of a collective imagination that would be begotten as a single poem, a single epic.

But there is more to it still. Perspective is not only linked to the generative principle of a singular language in architecture, painting and, consequently, sculpture and urban and theatrical scenography, whose unity it ensured. Parallel and simultaneously to this, scientific language was being defined anew in the strict terms given to it by Greek genius.

III. THE LANGUAGE OF SCIENCE

The speculation brought about by perspective assimilated Renaissance painters to geometers and mathematicians. In every respect all had the conviction of acquiring knowledge of the numbers that rule the Cosmos. Thus Ficino's neo-Platonism united art with scientific activity, which, it is true, was only beginning to peep through from behind a sole and unique unveiling of the sacred.

In the fifteenth century, Urbino was the meeting place of architects, painters, scholars and philosophers. The *condottiere* Guido da Montefeltro was their patron. In fact Ficino, Alberti, Pacioli, Francesco di Giorgio Martini, Piero della Francesca and the others were attracted to and remained in Urbino because of the school of mathematics located in that city. And together this group of artists was soon to make of Urbino a very famous city.

Their patron, Guido da Montefeltro, was one of the first men of

⁹ Bernard Berenson, "Florence," in *Les peintres italiens de la Renaissance*, trans. by Louis Gillet, Paris, NRF, 1953, pp. 39-79.

war to put geometric speculations to use in ballistics. He was vaunted because his victories were achieved with but a small number of victims. This, he said, came from knowledge of the science of firing. He was one of the first of the *condottieri* to take an interest in artillery and, through the science of movement controlled by numbers, to be interested in a strategy of instantaneous concentration of forces. From this he achieved shortcuts for manoeuvring his troops that threw his enemies off and stunning effects in his use of arms.

After that appeared the first scientific treatises born of perspective. First came Alberti's treatises on architecture and painting, which were soon followed by other studies of anatomy, physics, mechanics and astronomy from Piero della Francesca, Pacioli, da Vinci, Durer and, later, Vesalius and Galileo. These treatises were based on mathematical reasoning and were thereby radically distinguished from collections of practical formulas and alchemical incantations, the circulation of which was helped by the arrival of printing but whose days were by then numbered.

The recent and quite pleasing works of Hubert Damisch on the origins of perspective insist on the importance of Alberti's demonstration. Conceived for use by painters, Alberti's demonstration anticipates projective geometry. And for this reason Damisch quite rightly sees in Alberti's *De pictura* a fundamental text of modernity inasmuch as it is an accomplished scientific model.¹⁰

It is not unreasonable to affirm that the theoretical fecundity of Alberti's reasoned demonstration reigned over the development of sciences and space. It produced projective and descriptive geometries in the eighteenth and nineteenth centuries. It directly ruled the immense field of the practical-rational in which science retains links to the arts—up to Diderot's *Encyclopédie*—and without overlooking the rational evolution of techniques.

Alberti's example encourages us to study the moment in which the artist, following the living logic of his art, opened the way to the new science. "I do not seek, I find," said Picasso. How did such creators "find" the conditions that determine scientific method? How can an artistic method lead to a scientific revelation that

¹⁰ Hubert Damisch, *op cit.*, p. 16.

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seems to be an objective as fascinating to pursue as had been the pursuit of perfection in painting? This is the extraordinary event illustrated by Leonardo da Vinci and Albrecht Durer.

By the *Quattrocento* Leonardo da Vinci had adopted legitimate perspective to guide his studied research in optics, mechanics, cartography and ballistics. His speculations in the areas of hydraulics and aerodynamics were not to find their application until the twentieth century.

Drawing the nude led Leonardo da Vinci to anatomical verifications that, thanks to perspective, for the first time could be expressed graphically. The convolutions of internal organs—lobes of the brain, of the heart, of the intestines—cannot be projected on a sheet of paper without recourse to this device. By using perspective as a means of investigation that can be controlled by the senses, an artistic activity established, in acts of observation and of mastery of nature, a model of scientific activity that is both visual and theoretical. “Knowledge of perspective is necessary for the anatomist,” Leonardo stated expressly.

If his silverpoint drawings of horses, cats, weasels and birds are guided by an intuition of the structures of creation of the living form, he could make new progress only by proposing that the eye endow the subject with these networks of calculation and geometry, which then render it in a proven relationship with its environment and which make it possible to continue deciphering it. “*Ostinato rigore*” was the artist’s motto. To him do we owe the first conception of the experimental method.

Leonardo da Vinci definitively formulated the filiation of art to science. “... The divine science of painting deals with the works of man ... Through its foundation, which is drawing, it teaches architecture to make sure its structure is pleasing to the eye. Likewise for potters ... , goldsmiths, weavers and embroiderers. It invented the characters necessary for expressing itself in other languages; it gave numbers to mathematicians, taught geometers to design figures and instructed opticians, astronomers, designers of machines and engineers.”¹¹

Leonardo uses certitude of science to establish painting at the

¹¹ Leonardo da Vinci, *Traité de la peinture*, translated and revised by A. Chastel, Club des libraires de France, 1960, p. 36.

origin of the arts, of philosophy and the sciences, and he was one of the first to conceive of the latter in the already modern sense of controlled experiment. He did not establish this hierarchy through a painter's inclination but by the ways of an irrefutable experiment. From the exercise of painting he pursued his research as engineer and scholar; he continued his initial investigations, he developed his initial theories; he experienced philosophical astonishment before the mysteries of existence; he sought to pursue this in depth and derived the principle of evidence that is also found in Galileo and Descartes.

For them "evidence," "extracted vision" or "elected vision" take on their full meaning. "Do you not see that the eye embraces the beauty of the entire world? It is the master of the astronomer, the author of cosmography, the counsellor and corrector of all human acts. It transports men to different parts of the world. It is the prince of mathematics; its disciplines are totally certain. It has determined the heights and the dimensions of the stars ..." ¹² The drawings of Leonardo da Vinci are hypotheses constructing the organization that his intelligence attributes to reality. Leonardo invests in them his sensitivity, his intelligence, his passion and even those mysterious impulses of the unconscious that Freud, in *Un souvenir d'enfance de Léonard de Vinci*, demonstrated to have played such an important part. ¹³

Thanks to Freud we can sense in Leonardo a vital imagination—begotten in the most distant childhood memory, linked to states of intus-susception in intra-uterine life—in which phantasmic figures seek in vegetable organization and in animal forms, especially those of birds, their first "staging," their first scenography! His drawings of waterfalls and whirlpools reveal the same original psychic involutions. Architect, urbanist, hydraulics engineer, expert in ballistics, aeronautics and meteorology, his mind and hand follow an identical path: observation, hypothesis, experiment. The first three stages of experimental reasoning for Claude Bernard are followed as carefully as if they were the fruit of an analytic effort, but one conducted for the benefit of a unitary vision deriving from organic logic. The results achieved by

¹² *Idem*, *op. cit.*, p. 37.

¹³ Sigmund Freud, *Un souvenir d'enfance de Léonard de Vinci*, Paris, N.R.F., 1987; see also Serge Bramly, *Léonard de Vinci*, Paris, 1988, p. 141.

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Leonardo assume, from that point on, the nature of a theoretical model, in the Greek sense of the word, of coherent and logical overall views rather than in the sense of a law this word acquired later from the author of the *Discours sur le raisonnement experimental* and in our positive awareness. So much so that Leonardo is closer to contemporary explanations of physics, with simulated models, like cyberneticians, than the mechanical demonstrations of yesterday. His reasoning is already that of a bio-technician.

Jean Delumeau writes, "Leonardo the engineer ... lacked an adequate language."¹⁴ For heaven's sake, he invented it, and, even more importantly, he pointed out an art of questioning that would foil formalism forever!

Leonardo's disciples, with their pretty curly hair and given over to charming painting, were unable to profit from the manuscripts left behind for them by the master. These manuscripts were to wait three quarters of a century before finding in Galileo a man of science capable of using them. The observations and reasoning recorded by the draftsman derived from an absolutely new attitude. It was a matter of controlling the gestures that produced the painted work from point to point, thereby giving it the description "*more geometrico*" in order to ensure it could be taught and handed on. A mathematical statement of operations necessary for pictorial imagination now became possible; they were the fruit of the obstinate rigor with which the painter applied himself to perfecting his methods. However, this transformation of art into science, of the artist's gesture of intimate necessity into the geometer's freely and universally reproducible operations, took place under the stimulus of mathematical perspective.

And so were imaginations prepared for the style in which Galileo was to work and which would be called scientific language. The scientific potential of the theory of perspective described so cryptically by Leonardo da Vinci in his manuscripts, written from right to left so they must be read in a mirror, Durer brings into the full light of day in theoretical treatises that are completely explicit both in method and in purpose. In his now canonical biography of

¹⁴ Jean Delumeau, *La civilisation de la Renaissance*, Coll. "Les grandes civilisations," Paris, Artaud, 1984, p. 160.

the German painter, Erwin Panofsky writes, "Durer possessed first-hand knowledge of Euclid ... The first book of the *Introduction to the Art of Measuring* contains ... the first description in German of conic sections ... his method foreshadows ... the method of analytical geometry; his *Treatise on fortifications* reveals that he knew the then modern doctrines of theoreticians like Alberti and Giorgio Martini ... he discussed three-dimensional geometry ... a discipline totally neglected during the Middle Ages. In the third book of the *Instruction*, his physiognomical studies quite quickly take on a scientific character ... they are cited with respect by Galileo and Kepler."¹⁵ And so Durer became the calm, sure and firm creator of German technique.

Such is the logic that commands in an underground manner the creation of languages for the plastic arts and for the sciences in liaison with one another. In this respect the Renaissance was that singular moment that brought them together in an exemplary manner, an incomparable moment in the history of ideas, similar to the invention of geometry in ancient Greece, linked to the affirmation of the plastic instinct. But Greece left us no records of the stages of that development. Between the pre-Socratics and the appearance of the Doric style, we are left only with hypotheses. The Renaissance, on the other hand, allows us to follow the process step by step and from the very beginning.

The sciences of the fourteenth century were not constructed on rational foundations. This century was the high point of alchemical speculation. Pico della Mirandola made a place for this in his treatises; to be a scholar at that time often meant being involved in alchemy! Leonardo, who paid no attention to it, is an exception. Very little was known of true and certain science. And so it happened that the most certain, the most coherent, was born of perspective methods, and, from that point, of the art that employed them. Man, in order to make statements about the world and to decide what actions to undertake therein, had only the intuition of ideas armed with proofs acquired through individual experiments, although available to all: the experiments of artists. And if this artist invented in all orders, including the order of science, like

¹⁵ Erwin Panofsky, *La vie et l'art d'Albrecht Durer*, Paris, Hazan, Coll. 35/37, 1987, pp. 372-374.

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Leonardo and Durer, it was because the line of his progress—a reflection on water, the contour of a cloud, the rim of a hill on the horizon, a breath being drawn, a glance and, in the midst of all this, a questioning heart—made him enter into the realm of increasingly subtle reasons. We owe to them our own reasons.

If we examine the historical fortune of perspective, we see that it functioned like a grammar within a language and for its total use, even assuming a generative function within this language.

The three terms of the linguistic triangle that, according to Émile Benveniste, make up the universal structure of human languages¹⁶ are reflected in the three points of perspective: the “I” that designates the focal point of the eye; the “you” that the subject addresses by means of the visual code of geometry, destined to be recognized by all as the techniques of precision develop; and the “it” or the “that,” the “spoken” by which objects and beings are designated at the horizons of the world.

Panofsky maintains that with “*perspettiva costrutta* the affirmation of the self and that of the principle of reality are made evident and consolidated.”¹⁷ This decisive analysis deals only with the functions of “I” and “it.” We can complete it; for the cogent focalization of the optic cone, which is subjected to and guides the eye of the viewer, helps us to discover the “you” and thereby places us in the presence of the fundamental structure of this linguistic triangle whose generative action we propose to recognize in perspective. Must it be said that this structure, in our eyes, takes fully into consideration *perspective as symbolic form*, the basic formulation of which we owe to its exemplary historian?

Even more. A generative structure functions in perspective drawing that precedes and enhances the constitutive operations of spoken language. Thus perspective is capable of declining, in the grammatical sense of the word, the painter’s panting grasp of space for the benefit of verbal languages whose grasp of reality will always be less extensive than that of pictorial language. “The

¹⁶ Émile Benveniste, “La nature des pronoms,” in *Problèmes de linguistique générale*, coll. “TEL,” NRF, Paris 1976.

¹⁷ E. Panofsky, *La perspective comme forme symbolique*, coll. “Le sens commun,” Ed. de minuit, Paris, 1975. See also, *L’oeuvre d’art et ses significations*. “Bibl. des Sciences humaines,” Paris, NRF, 1969, p. 111.

painter,” wrote Leonardo da Vinci, “fixes an infinity of things that language will never be able to designate for lack of appropriate words.”¹⁸

In *L'origine de la géométrie*, Husserl characterized the essence of the operations of this discipline.¹⁹ We can deduce the reasons for the role played by perspective in painting. There is a link from perspective to articulated language, and this link is geometry. This science was born of the desire for precise measurement of figures in spaces and the ability to recreate these figures using an exact and free discourse. It should be understood that this rigor was obtained for words and for the usual syntax, for which geometry, again according to Husserl, isolates the powers of precise designation. However, placing something in perspective makes it possible to re-establish the operations of measurement of space. At that point the painter discovered in this medium the affirmed forms of articulated language transformed into numbers and pure relationships, but (and we should not forget this), it was not a question of the effective qualities of articulated language; the painter could not articulate them other than by maintaining his vision at an equivalent level of tension. At the moment of his “mathematical maneuvering,” he had to maintain in his art a very lively intuitive initiative or else risk stiffening his drawing. We know that the exclusive passion for perspective worked negatively on the spontaneity of Uccello’s drawing, whose line, however, was exceptional.

By favoring painting at the risk of detriment to language, perspective represented for the painter the most fruitful and most perilous of challenges: to avoid the danger of academism by untiringly applying one’s genius and one’s intuition!

The conspiracy of calculation and instinct, of geometry and spontaneity, of demanding reason and spirited impulse imposed on artists by drawing combined with perspective urged artists on to amazing exploits. They were led to explore the perceptive and intellectual keyboard without any kind of mutilation. By adopting perspective the painter acquired for himself an instrument that associated the left and right hemispheres of the brain: the right

¹⁸ L. da Vinci, *op. cit.*, p. 38.

¹⁹ Edmond Husserl, *L'origine de la géométrie*, translation and introduction, by J. Derrida, coll. “Epiméthée,” Paris, P.U.F., 1974.

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hemisphere that includes the cervical regions is responsible for the overall perception of space, its intuition and synthesis; whereas the left hemisphere provides articulated language, calculation, measurement, analysis, reasoning.²⁰ Out of this came an art of plenitude associating opposites in a dialogue limited by no boundary other than an anthropological one.

Perspective proposed to painters the opportunity of a continuously-offered transaction—as long as it was employed with talent—between logical awareness and instinct, between the *ego* and the *id*, the “spoken” and the “unspoken,” discourse and speech, rhetoric and poetry, between Apollonian evidence and the silent life of things—the “*stille leven*” of Dutch masters—the sum of a finite account and of a totality to be always improved. And so it is a story, that is a language ensuring the dialectical resonance of exchanges over generations. Thanks to perspective, access “to style,” which is mastery of the structures of invention of a language, has never been forgotten, has never ceased appealing to even the least painter who applied himself to it. Even today, this fragmented and problematic adventure marks in its retreat the great distance separating it from balance and harmony. The painting of Picasso illustrates it, appearing as its fractured mode, winning the challenge cast up to it with an expressive quality that is essential to its message.

Perspective conceived as perception, that is as a reflexive awareness of the object to be perceived, opened an inexhaustible quarry of investigations for the mind. It undertook that “infinite task” that Husserl assigned to European consciousness as a specific feature of civilization. It traced a path for it, sealing for it for more than four centuries a destiny both intellectual and artistic.

* * *

The Renaissance was dominated by artistic expression; this was its distinctive feature. The reasons for this were to be found in a certain historical conjuncture and, quite soon, in the decisive manner of taking paths toward solutions. The historical moment

²⁰ Francois Lhermitte, “La pensée sans langage,” in *Diogenes*, No. 117, Paris 1982.

was, in its groundswell, division, torment, whirlwind and turbulence. There was room only for the hardiest of mariners and for a single, always dangerous, maneuver.

The International Gothic of the fourteenth and fifteenth centuries left an image of Europe as a kaleidoscope terrified by its very diversity. Shaken by the effects of the Hundred Years' War, shattered by the fall of Constantinople, decimated by epidemics, troubled by the divided Germans, pressed upon by barbarous Slavs, made fragile by the recent schism in the Western Church, at a disadvantage because of little or poorly cultivated lands, Europe was a fragmented territory where everything was as agitated and as tortured as the flamboyant decoration of the times.

Nevertheless, some places were devoted to invention and to rebirth of signs. From the ashes of misery and violence, thanks to the effects of intense exchanges, the human, economic and intellectual success of the city shone in concentrated lights. Yet it is just this success that would find the place for its proper celebration in painting. The perspective used by painting does not simply organize a landscape; it hints at future conquests just beneath its surface. The use of it is an exploit of the desire to surpass and the fruit of a theoretical intelligence working on the "primal" image or, if one prefers, the native image received of things and of the world. Such was, in the beginning, the testimony of fresco painting in Italy and most especially in Tuscany. It was enough that urban life became more intense for mosaic painting, encouraged by a collective vital impulse, to break its rigid lines and everywhere yield its place to mural painting, less expensive but especially more immediate and more ductile, closer to the daily excitement of streets and squares.

But this suspense between an active and multiple exploration of the world and staging its spectacle in a single view summarizes the condition of the senses and intellect of Renaissance man. However, the reprieve between the manipulation of objects produced and exchanged and the seductive attraction of an imaginary inventory was controlled like a choreography by the framework of geometry proposed by perspective. It established Renaissance man at the intersection of a universe opened to the infinite and of a measuring process in which the scientific enterprise as a controlled experiment with reality was announced. And from this too came

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those numerous “utopias” of the times, those educational programs that set aside a special place for the study of the sciences, in addition to the literary education so naturally favored in those centuries when intuition nourished primarily, and directly, experimental speculation.

It is as if the city now sheltered groups of men in order to make them sense even better the retreat of the countryside, the movement of boundaries, the distance of the seas, the strangeness of an eye-opening solar system, the fascination with a new world across the oceans. Of all these things the city-dweller could only have an impermanent idea, fantastic visions. He had no means of establishing guaranteed reference points and, consequently, of creating long chains of reasoning. Later, from a house on the quays of Amsterdam, Descartes would see to this. For the moment the European saw himself endowed with multiple landscapes, surrounded by unknown seas. The earth, flora, fauna, peoples: everything was given to him in such excess that he could only go about discovering it all. At the least he could try to name it, classify it, understand it. But given the need to unravel the tangled knot that was all around him, Western man began a labor of selection. This was the contribution of Boccaccio, Chaucer, Rabelais, Montaigne, Fernando de Rojas. European man inscribed the experiences of the multiple world that assailed him on the screen of a memory that could record them, as much for the eye that discovered them in perspective as for the intelligence that, for the first time since the Greeks, was called to organize them in terms of a reasoned justification for which perspective was the model.

The men of the Renaissance placed an incandescent material on the anvil. Their blows were daring, their style lay in an initiatory gesture. And so the Renaissance was this energetic school that sought “the best of health,” where “great knowledge” was current, where they dared to calculate “by guesswork,” in the manner of the great navigators, and that brought together those qualities that Nietzsche has shown to rule over periods of creation.

Trusting in fragmentary calculations, a man from Genoa set out on a dangerous journey. But he did not overlook any source of information. He assembled the testimony of navigators of the Mediterranean and of the North Sea. The recently-established maritime connections between Genoa and Bruges via the Atlantic

had brought together the knowledge of mariners of the inland sea and northern oceans. The caravel was the practical synthesis of their experiences.²¹ Christopher Columbus studied the maps of his time; his method was as exhaustive as possible, and yet the information he collected was to a large extent incomplete. Speculating on an earthly globe reduced by a third according to the lesson of Ptolemy, he decided to depart. From that point it was necessary that he add intuition and audacity to his precautions. It was this mixture of science and daring, of deciding to embark on a dangerous adventure with only limited indicators available, that characterized the principal actions of the Renaissance. But the painter who casts a perspective grid on a landscape in order better to reel it in for himself provides the same lesson as that which Christopher Columbus dared to undertake. The painter is just as daring, brought to the horizons by the same calculations. What artists painted was also a new world.

The “invention” of the planet by a Navigator, and the entirely imaginary invention of the painter by the canvas that he sketches in are due to the same geometry. These “inventions” engender the controlled reproduction of terrestrial and marine surfaces. Portulans, astrolabes and sextants became increasingly more precise thanks to the teachings of perspective. Mercator’s planispheric projection is proof of its benefits for cartography.

Renaissance man was cast into a situation of discovery. No matter in which direction he turned his eyes, he was surrounded by looming horizons. He could but become more alert. Geography, cosmology, language, religion, politics, mechanics: everything solicited his interest. His consciousness was that of a person surrounded by new worlds, but he, in his most intimate forum, was driven by a desire to confront them. Perspective expressed the determination to understand them from a dispensation that for the first time provided a reasoned and overall viewpoint.

The Renaissance can be seen as a period of invention; it is defined by that and imposes its style by means of its exclusive operation. The artist capable of responding to this through his genius and his works was a hero to his generation because that was the primary need of his era. This was also the only path that could

²¹ J. Delumeau, *op. cit.*, p. 166.

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ensure him new progress. *The Lives of the Eminent Painters and Architects of the Renaissance* by Giorgio Vasari attests to this in as many ways as it celebrates individual talents. But all were creators. And this author praises them as much for their enthusiastic curiosity as for their knowledge.

The style through which Renaissance men assumed this state of gestation is similar to poetry, a poetry that preserved in the acts of art, as in the acts of the nascent sciences, the magic, magnetism, religious questioning and that philosophical astonishment whose complex figure is represented by Zenon, the hero of Marguerite Yourcenar's *L'oeuvre en noir*, and whose portrait could never be attempted other than within a work of art.

So we return to our most daring consideration, namely that the sciences in the Renaissance were born of the research of artists. Not that we claim that all activity that could derive from the sciences was the prerogative of artists alone. It was in fact practiced, with varying degrees of success and precision, by alchemists, physicians, engineers, astronomers. We would simply say that the most advanced exercise of the sciences lay, for one moment, in the hands of the best artists: Brunelleschi, Leonardo da Vinci, Alberti, Piero della Francesca, Durer; that *for one moment* their artistic research led to scientific discovery and that this was because of a conjuncture linked to the development of their art.

This was the *Kunstwollen* of the Renaissance.

The human species is distinguished by the invention of languages; created societies exercise this invention only through an effect of acquired power. Nevertheless, this invention continues intact through the initiative of its artists. For artistic aims emanate from the profound structures of a person; they challenge that person in his individuality and furnish that singularity that is the mark of every new work. Creators keep awake the powers of renewal of peoples. Art places "the tribal signs" on the forge, refines them and tempers them so that once again the power over beings, things and the world can be shared more intensely.

There are no more decisive events to be observed in civilization. Man, inventor of languages, has never more been like himself than at the time of the Renaissance.

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