

# LEONARDO DA VINCI MASTER DRAFTSMAN

EDITED BY CARMEN C. BAMBACH

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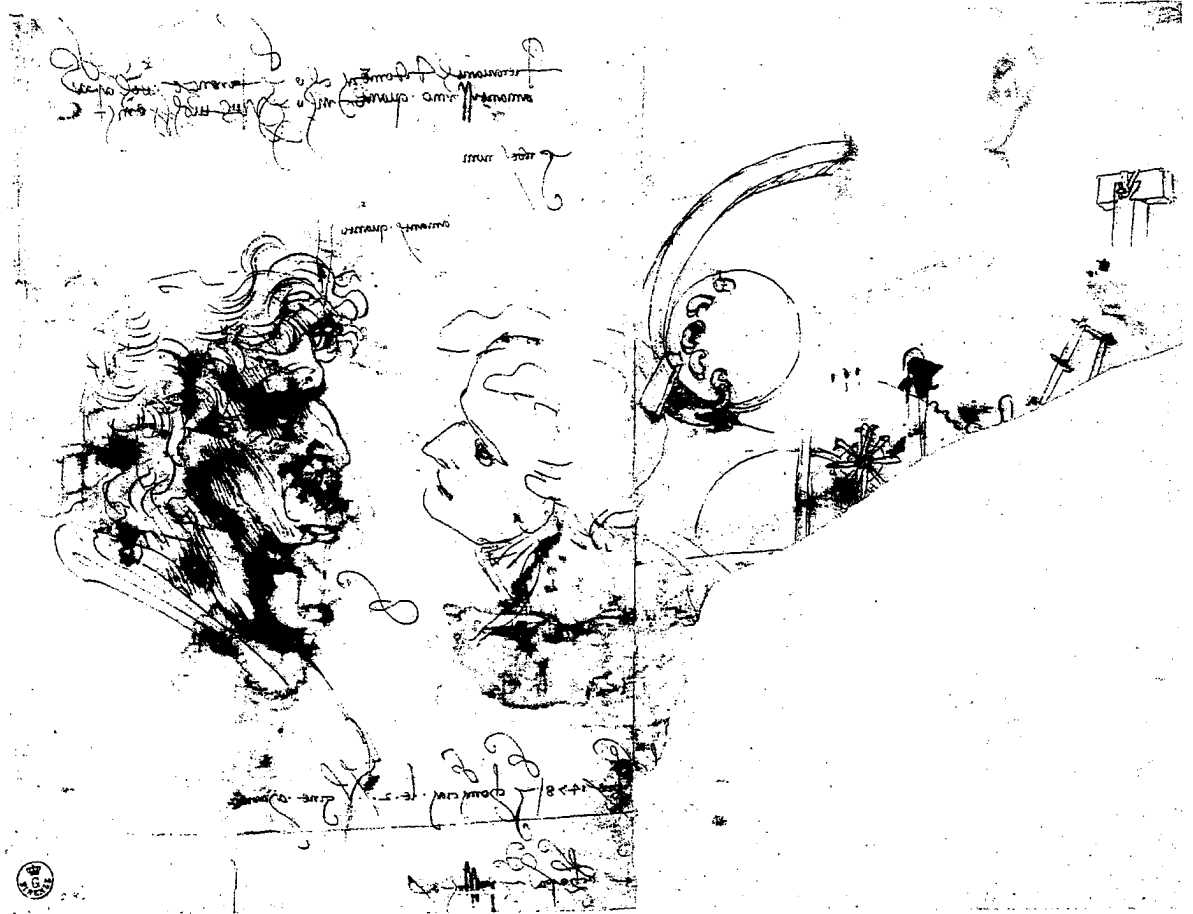


Fig. 39. Leonardo da Vinci, *Notes and Sketches of Heads and Machinery*. Pen and brown ink, 201 × 267 mm. Gabinetto Disegni e Stampe degli Uffizi, Florence 446 E

# WORD AND IMAGE IN LEONARDO'S WRITINGS

CARLO VECCE

In terms of quantity alone, Leonardo the writer was far more productive than Leonardo the painter. Indeed, the physical act of writing probably occupied the largest part of his working day and was perhaps also the most satisfying part of it. The artist would have shut the door to his study, leaving behind his myriad daily tasks (the unavoidable but distracting requests of princes and patrons, visits from the curious, the squabbles and petty jealousies of his pupils, the haggling with workmen, carpenters, and suppliers). By the light of a candle or a lamp, he would don his "ceremonial robes" and take up the dialogue he had interrupted the evening before.

A dialogue with whom? In part it was with the classical *auctores* (authors) or, to use Leonardo's word, *altri*—just like Niccolò Machiavelli, who, in his famous letter to Francesco Vettori (1513), described his nightly communing with the ancients. To some, Leonardo was an uneducated man (an *omo senza lettere*), because of his imperfect command of Latin and his lack of university training in disciplines like medicine, physics and mechanics, and natural philosophy. Leonardo himself, however, would have been dismissive of anyone who followed only the authority of ancient writers in his study of the natural sciences and ignored what was to be learned from Nature, the true teacher. Nonetheless, Leonardo had to ally himself with traditional schools of scientific and philosophical study even to take an independent position on them. To the self-taught man who stood as far from the university lecture room as the halls of the humanist academies, the ancient body of scientific learning, like that of ancient literature, was represented by an immense body of writing. For Leonardo it was a wall of words to be scaled only with some effort or a labyrinth that could be entered only with the help of humble but effective tools—elementary Latin grammars, abacus manuals, and lexicons, the most useful of which were vernacular dictionaries and lists of abbreviations. At the beginning of his career Leonardo juxtaposed images to this world of words and writing. He did this through painting, a form of expression he considered far superior because of the immediacy of its representation and its ability to communicate.

The extraordinary richness of the Italian vernacular, Leonardo's mother tongue, can be contrasted to the notable difficulties the artist had (until he was at least forty, and perhaps beyond) with Latin, his "paternal" tongue, that is to say, his second and learned language. Latin was the language of the scientific and humanist traditions, but it was also that used by notaries, the profession to which his own father, Ser Piero da Vinci, belonged (see essay by Alessandro Cecchi). A notary made his living by writing public documents, but these documents had a value different from writing in which learning was communicated and preserved. Notarial acts recorded, instead, the official events of social life in a performative and normative way, and notarial writing had its own characteristic decorative flourishes. These gave the script a great solemnity, and they included paraphs, which embellished the upper and lower strokes of certain letters, and graphic symbols in the documents themselves. The influence of this type of calligraphy can be seen in Leonardo's youthful writing, even in what must otherwise have been meaningless penmanship exercises. For example, in the notes accompanying two heads, one old and one young, on a sheet in the Uffizi (fig. 39) that is dated 1478 is a line that is transformed into purely expressive spiraling doodles. These flourishes seem almost to comment on or illustrate Leonardo's avowal of dear friendship for one Fieravanti: "Fieravanti di Domenico in Firenze e compa' amantissimo quanto mio"; "in dei nom"; "amant[issimo] quanto"; and "e compa' in Pistoia."<sup>1</sup>

In these instances the genesis of the writing is very close to that of the drawing: moving the tip of the pen across the white surface of the paper creates a line that can be transformed into a character, a word, or a drawing. Leonardo wrote: "the first picture was of a single line only, surrounding the shadow of a man cast by the sun onto the walls" (Paris Ms. A, fol. 97v = LDP no. 129, ca. 1492).<sup>2</sup> The reference here is to a story by Pliny the Elder (35:5: "umbra hominis lineis circumducta"), to which Leonardo adds the point, namely, that a line, an immaterial, purely imaginary entity, is nonetheless the origin of the science of painting: "The principle of the science of painting is the point; second is the line; third is the surface; fourth is the body which is enclosed by these surfaces. And this is just what it is to be represented, that is to say, the body which is represented, since in truth the scope of painting does not extend beyond the representation of the solid body or the shape of all the things that are visible" (LDP, no. 3, ca. 1510–15; and see LDP, no. 1).<sup>3</sup> Thus letters and drawings originate from the same operation—the movement of the pen over the blank surface of the paper—and in the act of separating them from oneself the idea is carried through the hand and is fixed in the material.

Leonardo was certainly aware that the spoken word, not writing, is the most natural way to transmit language. This was the world of the fables and stories that he had heard in the house of his mother, Caterina, or his grandfather, Antonio, or that were recited by singers in the town square in Vinci. Popular sacred plays were communicated orally, and so was

the practical teaching in Florentine workshops like that of Andrea del Verrocchio. In the notes for his *Paragone*, a comparison of painting and poetry, which were begun in 1490 (now Paris Ms. A) and then expanded upon some ten years later in the texts collected in the first part of his planned *Libro di pittura*, Leonardo rooted his argument in the ways by which these art forms are transmitted (visually and orally) and received (by sight and hearing). His affirmation of the primacy of the eye, which he called the "window of the soul," has extraordinary anthropological value since it corresponds to the historical moment in which he lived, when the medieval world was passing into the modern period, a passage marked by the supremacy of visual perception over the senses of hearing and smelling in the representation of a human being's relationship to the natural world. The definition of poetry as "a painting one hears rather than sees" (LDP, no. 20) or a "blind painting" (LDP, no. 21) refers clearly to the oral quality of a text. In only one case does Leonardo acknowledge the presence of writing, which he considers a form of *disegno*, that is, design or drawing: "you writers are designing manually with the pen what is found in your mind" (Paris Ms. A, fol. 99v = LDP, no. 19).<sup>4</sup> It is painting, however, that "has found the signs used to express the different languages" (LDP, no. 23).

While advocating the primacy of seeing, Leonardo nonetheless remained deeply attached to the sense of hearing. Orality is dependent on memory, and, in an oral culture, even ideas and concepts tend to be articulated with formulae that allow them to be committed easily to memory, whether by such rhetorical strategies as repetition and antithesis, alliteration and assonance, epitaphs, verbal exercises, proverbs, and the like. The fundamental stylistic characteristics of oral literature are syntactical coordination (parataxis), aggregation, repetition, and redundancy, with a tendency to preserve structure while leaving the speaker (who might also intervene in the microstructure of the text) freedom and originality in his interpretation through, for instance, emphasis and participatory gestures. Orality is naturally collective, directed at a specific audience, reaching all members of an audience at the same time, and adapted to the actual circumstances of its reception. Hearing is a sense that unifies sounds into a sensory bundle that is then internalized by the listener. The phenomenology of sound gives value to the interior: it penetrates deeply; it tends to coalesce. Sacred writings that preserve the original, spoken quality of an utterance, even in its written form, seek to preserve this quality. The principal advantage of speaking comes in its interaction with other communicative activities (gesture, movement, proxemics) as well as other actions (and here one might recall the introduction to Benvenuto Cellini's *Autobiography*, in which the writer says of his assistant, "I set him to writing, and while I worked I dictated my autobiography to him"), allowing the listener to identify the speaker, and the speaker to verify that he is being heard in real time. The same rapidity of communication is also a disadvantage, however, because the sounds die on delivery; outside of memory, nothing remains, as the words dissolve into air, leaving that channel open for another message.<sup>5</sup>

Like Cellini, Leonardo sometimes dictated his texts, as can be seen in the nonautograph sheets of the Codex Arundel and the Codex Atlanticus. The earliest of these dictated texts, beginning with the artist's famous letter to Ludovico Sforza "Il Moro," were written in a variety of hands by his pupils and friends during his first sojourn in Milan. The later sheets show the more regular, almost humanist, script of Francesco Melzi, Leonardo's last pupil, whom he employed particularly to write letters. Dictation, like normal speaking, consists of much repetition, with the syntax developing directly from the flow of ideas. Linear development prevails, and completing the spoken text—or reaching the end of its recitation—requires time. While an image is immediately present in space, a spoken text, like music, occurs in time. Although an image does not allow for a polyphony of overlaid voices or for harmony, painting does permit the simultaneous reading of form and color: "The same occurs with the beauty of anything imagined by the poet, because such things are conceived [by him] separately at separate times, and the mind does not receive them in any harmony" (LDP, no. 21).<sup>6</sup> In this case, Leonardo wrote, "the painted imitation can provide a surrogate in large measure—a form of substitution not permitted the poet who, though wishing to rival the painter, cannot do so because the words with which he delineates the elements of beauty are separated from one another in time, which leaves voids between them and dismembers the proportions. He cannot delineate these elements without excessive wordiness and, not being able to depict them, he cannot construct the proportional harmonies that are produced by divine proportions. During the very time that it takes to embrace the contemplation of painted beauty, it is impossible to accomplish a beautiful description, and it is a sin against nature to send via the ear those things that should be sent via the eye" (LDP, no. 23).<sup>7</sup>

Beginning with his brief narratives, his fables and jokes, much of Leonardo's writing has the character of speech. This is true, more explicitly, of his "prophecies," which were intended to be recited at the festivals of the Sforza court. For instance, the stage directions for reciting the prediction "Della fossa" suggest that it be said "in a frenzied or berserk way, as of mental lunacy" (C.A., fol. 1033r, formerly fol. 370r-a).<sup>8</sup> In his scientific and technological texts this speech function is mostly connotative, with Leonardo often making use of an interlocutor (real or virtual or perhaps also just himself), in the role of teacher, to transmit a lesson or precept, to demonstrate a theorem, or to illustrate the course of an experiment.

For the young Leonardo in Verrocchio's workshop, a piece of paper was intended for drawing, for putting down sketches of compositional ideas, for copying the master's drawings, for tracing designs and projects for mechanical objects, and only occasionally for writing words or sentences. When these occur, they usually have no relationship to the drawings on the same sheet. A good example, on a page in the so-called Verrocchio Sketchbook that is attributed to Francesco di Simone Ferrucci, is the brief notes that Leonardo apparently made about his friends, his outstanding debts, and monies owed to him. Among Leonardo's jottings, written



Fig. 40. Workshop of Andrea del Verrocchio, *Figure Studies and Epigraphic Letters*, with words inscribed on the right by the young Leonardo. Pen and brown ink, 280 x 200 mm. Musée du Louvre, Paris RF 453

at the end of the 1470s, backward and next to a drawing by Francesco, we find the phrase "nicholo / di michele / debbe f. (?) ccc. s. (?) 50" (see also cat. no. 12). Another note, perhaps also by Leonardo, occurs a little farther down the sheet and to the left, but this time is written from left to right: "simone di miniato / b(er)nardo miniat [ . . . ]" (fig. 40). There are many similar texts on contemporary sheets, as, for example, a humorous recollection of his uncle: "Francesco d'Antonio in Firenze e compa' in Bacchereto deono dare fiorini MCCCCIII" (C.A. fol. 878v, formerly fol. 320v-a); "Vante di Francesco da Castello Fiorentino e comp" (C.A. fol. 1112v, formerly fol. 400v-a); and "Io Lionardo," "in dei nomini amme[n]" (C.A. fol. 1054r, formerly fol. 379r-a). These brief notes are similar to a type of writing that must



have been familiar to the young Leonardo, the *libri di ricordi*, literally “books of recollections,” written by Florentine and Tuscan merchants and bourgeois citizens in the fifteenth century. These contained often brief notes on individual sheets that recorded the birth and death dates of children and other important events in a family’s life and were not unlike that made by Leonardo’s grandfather Antonio da Vinci to note the birth of his grandson in 1452.

Noting down events has nothing to do with orality; it is truly and properly writing—the recording of a memory that needs to be materially fixed in order to transmit its contents to another time or place. It is not accidental, then, that Leonardo wrote the names of friends on another sheet of paper next to the mysterious fragments of a letter, itself the type of text meant to be communicated across distances (C.A. fol. 18r–v, formerly fol. 4r–b–v–b). This sheet by the young Leonardo has drawings of machinery and gears. The writing on the recto (which Marinoni considered “idle scribbling,” written from left to right in an “almost affected hand, idle, almost a game or trying the pen”) is generally arranged in a column at the center of the left side, leaving the right side for drawings (tongs, an artillery piece, a three-wheeled cart, and a variety of gears). On the verso, however, the drawings are placed along the vertical axis of the sheet, ignoring its center line, and the text, also written from left to right, was added in the margins later.

Anyone familiar with Leonardo’s manuscripts knows both how often they contain names of people and places, and how valuable these are for determining a chronology of the individual sheets and the master’s ideas. Similar observations can be made about dates, beginning with the earliest to be found on any sheet by Leonardo, “dì di s[an]ta Maria della neve / addj 5 daghossto 1473” (the [feast] of Saint Mary of the Snow, on the day of August 5, 1473; fig. 6). The date, too, is a distinct element of writing, as opposed to speaking, since it allows a text or drawing to be removed from the continuous and atemporal flow. Dates are temporal markers, and as such they verify the sheet.<sup>9</sup> It is interesting to note, though, that they are almost never put on individual drawings (and for this reason, too, the youthful drawing of a landscape in the Uffizi is exceptional). In his manuscripts, Leonardo used dates to fix important moments in his artistic career—beginnings or moments of starting anew. We find an example on the verso of figure 39: “[dice]mbre 1478 incominciai le 2 Vergine Marie” (December 1478 I began the two Virgins). The same is true of a note, “a dì 23 d’aprile 1490 cominciai questo libro e ricominciai il cavallo” (on April 23, 1490, I began this book and started again on the horse) (Paris Ms. C, fol. 15v), at the beginning of what was to be the first sheet of Paris Ms. C, in Claudio Scarpati’s words “the first manuscript affirming Leonardo’s decision in favor of the ‘book.’”<sup>10</sup>

Drawing and writing have separate functions in Leonardo’s earliest sheets. Usually the large drawings have no text, and the sheets on which text prevails have no drawings. The description of a sea monster and a cave in the Codex Atlanticus or the Codex Arundel demonstrates this point:

Oh, how many times were you seen through the waves of the swelling and great ocean, with your bristles and black back, like a mountain, with your heavy and imposing carriage! And often you were seen through the waves of the swelling and great ocean, with imposing and heavy movements turning in swirls in the waters of the sea, and with your bristles and black back, like a mountain that conquers and overwhelms. Oh, how many times were you seen through the waves of the swelling and great ocean, like a mountain that conquers and overwhelms, with your bristles and black back moving through the waters of the sea with your heavy and imposing carriage" (C.A., fol. 715r, formerly fol. 265r-a; see also Ar., fol. 155-56).<sup>11</sup>

These texts, dated to Leonardo's first Florentine period (1478-80), have a strongly visual character. From a rhetorical point of view, Leonardo uses description as the basic technique of his more creative writing. The object is presented as if it were in front of the painter, and it is analyzed in details that are "told" in linear succession. Such description allowed Leonardo to overcome, in writing, the problem of *inventio*—invention, which in contemporary schools was usually entrusted to the tiresome memorizing of *loci communes* and *flores sententiarum*—by using a strategy particular to painters. Nor is Leonardo's description static, merely decorative or juxtaposed to the narrative content (as it might be in the classical rhetorical technique of description—*ekphrasis*—or in Angelo Poliziano's contemporary *Stanze*); it becomes a dynamic representation of objects in movement, inserted in a temporal sequence that would be difficult to render with a symbol or in a painting. The things represented are most of all "seen," and then "described" according to a fairly common pattern—from the universal to the particular, from above to below according to angular and circular movements.<sup>12</sup> A "descriptive intentionality" predominates,<sup>13</sup> transforming, for example, the notes in Paris Ms. A into a coherent series of practical instructions destined for a book on painting based on the analogy between the modality of writing and the techniques of drawing. We also find here, however, that he has moved somewhat beyond orality. Latin constructions are adopted, vocabulary is enriched (these are the years of Leonardo's laborious study of Perotti's Latin grammar and memorization of the lists of learned vocabulary in the *Codex Trivulzianus*), and the rhetorical structure of the text is strengthened with the use of figures that depend for their effect on repetition, reversal of the order of words, and so on (chiasmus, anaphora, inversion, repetition, a crescendo of a lexical series and enumeration). The effect is to bring the prose to the rhythmical level of poetry.<sup>14</sup> We also find this quality in the structure of the fables and in autonomous passages that have nothing to do with the development of a narrative sequence. They describe movement and transformation with verbal imagery (the rhythmic cadence of the beating wings in the flight of the magpie, "ora qua ora in là") and anthropomorphic metaphor, such as the flame that sings "with sweet murmur . . . with its tail raised and its head lowered, it [the magpie] flies off the branch, putting its body's weight on the wings, which flapping above the displaced air, now here and now there, curiously using [uses] the tail for steering" (C.A., fol. 188r, formerly fol. 67r-b);<sup>15</sup> or "Now, the

fire having rejoiced [exuberantly emerged] from the dry wood logs, begins to rise, catching the air in between the spaces of the logs, from which, with playful and mirthful passage [movement], it weaves itself into being. Having begun to exhale [emit] forth glittering [shining] and sparkling [flickering] little flames, [the fire] quickly dispels the gloomy darkness of the enclosed kitchen, and the flames that were already grown played [play] in the air around them and singing with sweet murmur they created [create] soft sound" (C.A., fol. 321r, formerly fol. 116v-b).<sup>16</sup>

We should also consider the reverse, the use of iconic signs or symbols as the equivalent of words or a verbal text. The icon, characterized by its resemblance to the object it replaces, had for Leonardo the qualities of universality and invariability, comprehensible even if its linguistic context changed. The image "speaks," but functions as a text. It was to explore the expressive potential of symbols that Leonardo embarked on what was perhaps the strangest intellectual experiment of his life—the compilation of his rebuses, or series of pictographs. Rebuses are pictures or symbols that suggest words or phrases and that can be combined into sentences with meanings that are very different from the original pictures.<sup>17</sup> The most interesting aspect of this exercise was the reduction in the size of the pictographs. They became small drawings consisting of only a few strokes of the pen, but representing the essential properties of the object, animal—even in motion—or acrobatic game.<sup>18</sup>

The pictographs are similar to the lists of learned vocabulary Leonardo compiled in the Codex Trivulzianus; they were his "libro di mia figure" (book of my figures), a repertory of images to be memorized, assembled on the basis of a figural mnemotechny that took advantage of the reproduction of images and their serial repetition (see Ar., fol. 250r; LDP, no. 173).<sup>19</sup> These drawings are not very different from ideograms and are thus not far removed from writing. It might be mentioned that Egyptian hieroglyphics were in vogue among Italian humanists—they appeared in the *Hypnerotomachia Poliphili* published by Aldo Manuzio in 1498—at the time Leonardo was working on this project.

The association between images and words is also at the heart of the *imprese* and *emblem*i—devices and emblems—Leonardo made for members of the Sforza court (and they are one of the first examples of a fashion that would spread throughout Europe in the sixteenth century). The same is true for the artist's allegories, constructed with drawings and explanatory texts, in which instructions for painting, in anaphoric cadence, predominated: "a la fama si de' dipignere" (Paris Ms. B, fol. 2v); "la infamia sottosopra figurare si debbe" (Paris Ms. H, fol. 61r); "fannonsi," "figuransi," "questo si è," "qui si figura," "questa invidia si figura," "fassi-fassile" (see cat. no. 54 and Christ Church, Oxford, 0037).

In these, the correspondence between word and image was not always fixed as it had been in the pictographs. Leonardo's *imprese* and allegories were conceived in movement—as were many of his drawings and compositional sketches—and this process of transformation is

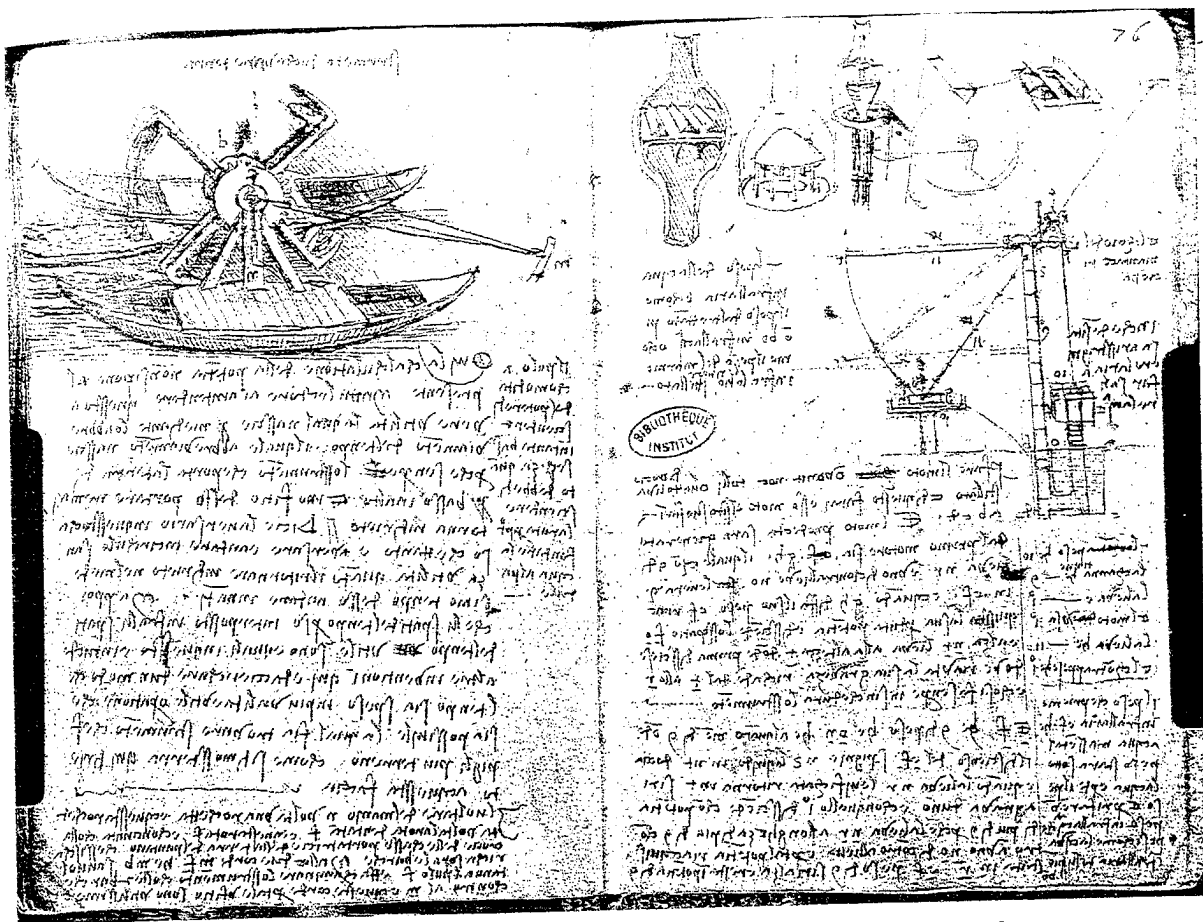


Fig. 41. Leonardo da Vinci, *Hydraulic Devices*. Manuscript E, fols. 75 verso and 76 recto. Pen and brown ink, 150 × 105 mm. Institut de France, Paris 2176

visible both in the iconic version and in the passages of text, such as those on a sheet at Windsor in the space left free by several geometric proofs (cat. no. 110 recto and verso). The recto has variations on the motto "non mi stanco nel giovare," which resemble different versions of an *Iris fiorentina*. It is worth noting that the various versions of text and image are independent of one another, which can be explained by Leonardo's quest to express himself better both verbally and graphically.

The variations in the allegories of truth and falsehood on the verso of the Windsor sheet are a laboratory for Leonardo's other and more complex allegories, and as such they are analogous to Botticelli's famous picture of the allegory of Calumny (Uffizi, Florence). The artist began at the center of the sheet (cat. no. 110) with an equivalence between image and abstract concept (Truth-sun, Falsehood-mask). He then added two further concepts without images (Innocence and Malignancy) but that can be identified in the two marginal figures. A brief text, however, ties fire to the action of unveiling Truth, and several drawings present variations on the theme of the mask (the "face," a symbol also used in the rebus) being destroyed by fire, while the rays of the sun illuminate the true face hidden beneath it. Other drawings

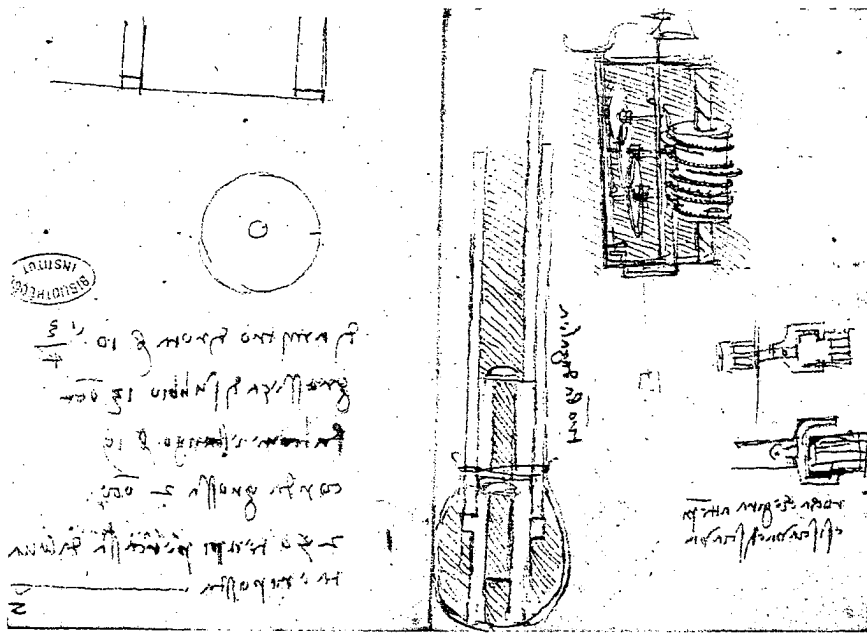


Fig. 42. Leonardo da Vinci, *Studies of Gears*. Ms. L, fols. 25v-26r. Institut de France, Paris 2182

return to the image of the sun, the heat of which seems to melt a mask evidently made of wax.<sup>20</sup>

The most common and even most natural arrangements of Leonardo's "writing spaces" are those that include text and drawing (fig. 41), and in these instances it is relatively easy to trace their genesis and find archetypes. The first of the surviving manuscripts, Paris Ms. B, which dates

from about 1486-88, is in large part a collection of notes taken from the Italian edition of Roberto Valturio's *De re militari* produced by Paolo Ramusio (Verona, 1483). It reveals how close Leonardo's method of collecting texts was to that of contemporary humanists—for instance, Angelo Poliziano, Bartolomeo Fonzio, Aulo Giano Parrasio, Jacopo Sannazaro, and Pietro Bembo, who compiled so-called *zibaldoni*, or commonplace books.<sup>21</sup> These consisted of excerpts from classical texts and numerical references to the folios or pages of the books from which passages were copied—a procedure that arose in large part because the invention of printing now allowed for more than one copy or edition of the same book. This humanist technique allowed for new methods of organizing knowledge and, in a certain sense, created the foundations of the modern encyclopedia, namely, the compilation of knowledge tied to disciplinary hierarchies along with the principle of cited authorities. We find Leonardo using numerical cross-references for the first time in Paris Ms. B. Interestingly, these numbers correspond neither to the 1483 edition of Valturio's work nor to the original Latin text of 1472, but rather to an intermediate and now lost notebook of his own in which Leonardo had already transcribed these passages.<sup>22</sup>

We now know, thanks to the work of scholars like Nando De Toni, Girolamo Calvi, and Augusto Marinoni, that Valturio's was one of the books Leonardo referred to most often between 1486 and 1490 for his information about the military arts and war machines in Paris Ms. B (the result of the promises the artist-engineer had made to Ludovico "Il Moro") and for the list of vocabulary in the Codex Trivulzianus. Yet Valturio was not simply a textual source. The editions of his work were among the most beautiful illustrated books of the quattrocento, and Leonardo must also have appreciated them for this connection between

text and image. An emphasis on the relationship between writing and illustration is a distinguishing characteristic of the architectural and engineering treatises of the Renaissance, for instance, those of Francesco di Giorgio Martini, Antonio Filarete, and Piero della Francesca, as well as of manuscripts by engineers and *omini pratici* (skilled or practical men) like Mariano di Taccola, Buonaccorso Ghiberti, and Lorenzo and Benvenuto della Golpaja.<sup>23</sup> These treatises represent, in addition to the *libri di ricordi* and *zibaldoni*, the third and most important model for Leonardo's writing.

These texts, even when they reach the conclusive form of a book or a treatise divided into books and chapters, all remained in manuscript form. (The only exception is the Latin edition of Leon Battista Alberti's *De re aedificatoria*, published by Poliziano in Florence in 1485, a text without illustrations that was of interest principally because of its humanistic and linguistic efforts to come to grips with Vitruvius's difficult text on architecture.) Because of the extreme difficulty of reproducing images in print, these books and treatises circulated in the form of sumptuous manuscripts that were carefully illuminated with illustrations made under the supervision of the authors themselves. Leonardo had, for example, seen the first edition of Francesco di Giorgio's treatise on military engineering—written at the court of Urbino and finished, after Duke Federico's death, in about 1484—by the time he was working on his Paris Ms. B. Leonardo became acquainted with Francesco di Giorgio himself in Milan and Pavia in 1490, and he then owned and annotated a lovely manuscript copy of the second edition of the treatise in about 1502–4 (Biblioteca Laurenziana, Florence, Ashburnham 361). Leonardo probably also knew about sketchbooks from Verrocchio's workshop (see cat. nos. 4, 8, 12); the first example we have is the Codex Forster III, circa 1487–90. These were small pocket-sized notebooks that engineers carried with them at work sites to note down technical problems and their solutions or to show pupils or workmen how to work a machine or mechanical device (fig. 42).

"Demonstration" is the key here. Drawings were used to make an object visible in a practical sense, immediately and without too much explanation (fig. 42). In rhetoric this technique of demonstration is called *evidentia*. It is based on a direct relationship between sender and receiver and is similar to what happens when one speaks to another. Here we find ourselves far from the utopian project (of substituting objects for words for the purpose of constructing a universal language and grammar) realized in the strange Academy in the continent of Lagado that Gulliver visited during his travels. It is also true, however, that we stand at the very beginning of modern science, when "things" (verifiable by experimentation) begin to take their revenge on "words," which had reigned supreme in ancient books and among Renaissance humanists. Leonardo had already substituted "things"—symbols—for words in his games of picture writing.

Scientific and technological illustration is not purely decorative, but it does go beyond a text by allowing a thing to be visualized more clearly than is possible in a verbal description

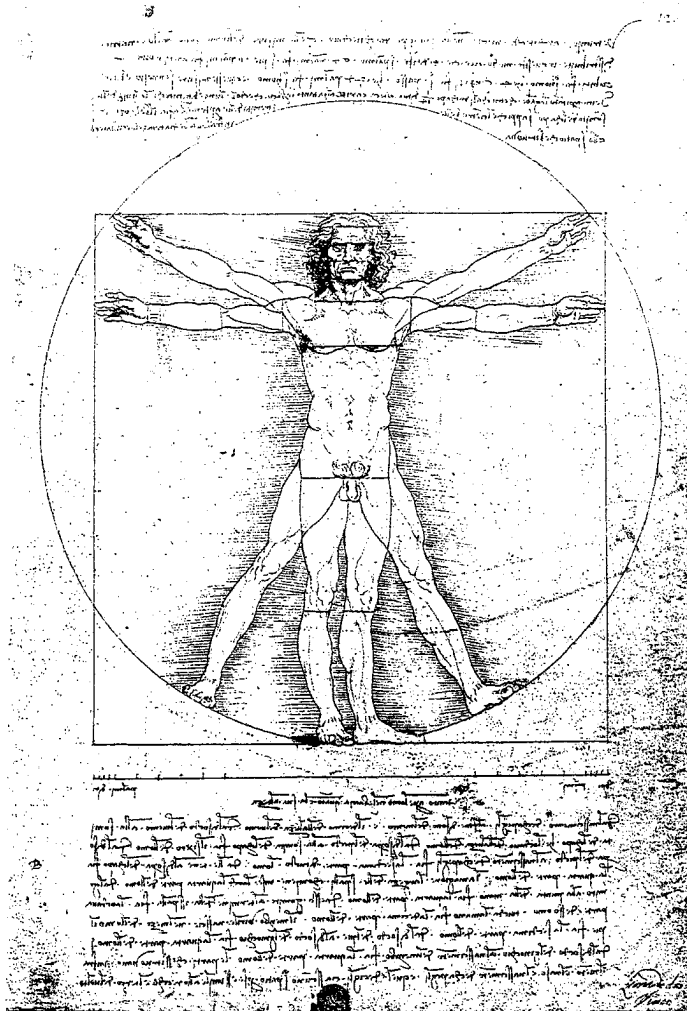


Fig. 43. Leonardo da Vinci, *The Proportions of the Human Body According to Vitruvius (The Vitruvian Man)*. Pen and brown ink, brush and some brown wash, over metalpoint, 344 × 245 mm. Gallerie dell'Accademia, Venice 228

alone. An example is the difficulty of reading and understanding Vitruvius's text, much corrupted through its long transmission from antiquity, without images. This challenge led Leon Battista Alberti to write his *De re aedificatoria* and Fra Giocondo da Verona (a humanist but also an engineer and architect who possessed the necessary technical skill) to produce the first illustrated edition of Vitruvius (Venice, 1511). And yet even the most exacting and detailed drawing cannot completely represent the reality of an object. The first difficulty comes in the transition from three dimensions to two, though this can be overcome by representing the object from several points of view (Leonardo's application of this technique, already in use in the fifteenth century, to his late anatomical drawings is nothing short of miraculous). Another apparently insurmountable difficulty is the representation of movement—a machine at work or an object being made—which a single, static drawing cannot convey. It was possible,

however, to make a series of images that (like photographs) capture the different phases of movement, or one might also superimpose one image upon another. The latter technique has been noted in both the drawing of the so-called *Vitruvian Man* (fig. 43) and the extraordinary drawings—not by Leonardo but based on his work—in the Codex Huygens (Pierpont Morgan Library, New York).

Leonardo was certainly aware that images lacked something that only a text possessed. Thus he returned to writing, which for him was already and naturally strongly visual both in its *inventio* and *dispositio*. In general, writing that accompanied a drawing tended to be arranged rather formally around it, next to it, and sometimes within it, like the text in the circle traced by a hygrometer above the study of figures for an *Adoration* (cat. no. 29): “modo di pesare laria / eddi sap[er]e qua[n]do sa / arromp[er]e il te[m]po” (way of weighing the

air and not knowing how time is interrupted); and, written outside the circle. "spugna / ciera" (sponge / wax).

Headings were often placed at the top center of a sheet, and texts were then handled, in both appearance and execution, as if they were part of a single, intellectual unity (as indeed they were). Text and drawing gestated together, and, exercising mutual influence, were structured together in the formation of an idea. It is often difficult to discover which came first, especially when there are several subsequent variations of the same image and the same text on the same sheet. Leonardo worked intensely on variations, which was for him the most natural way to pursue the evolution of an idea. Thus textual variation, as part of the intellectual process, is like his continual variation of drawn images, an essential ingredient in Leonardo's permutatory technique.<sup>24</sup>

In Leonardo's drawings, an image outlined in red or black chalk was then reinforced with pen and ink. Similarly, texts were written first in red chalk (see cat. no. 64). Words would then be traced with pen and ink, character by character (and as in a palimpsest, one can distinguish the writing beneath and above), after which they would be transcribed in another notebook.



Fig. 44. Leonardo da Vinci, *Map of Imola*. Pen and brown ink, brush and watercolor, 440 x 602 mm. The Royal Collection, H.M. Queen Elizabeth II, Windsor Castle RL 12284



Rewriting and transcribing were never mechanical tasks. At each stage Leonardo introduced changes that create the sense of a text in perpetual movement. The page was freed to accommodate the different phases of this movement because writing had renounced the fixed quality it had throughout the history of civilization. Leonardo's scientific investigations were also liberated since they were no longer hindered by the need to assume the quality of permanence and thereby benefited from this mobility by formulating a new approach to the study of natural phenomena.

Locating, or "localization" (which for humanists had been restricted to the textual universe of their *zibaldoni*), worked in two directions—from the drawing to the text and from the text to the drawing—and was achieved by a system of alphabetical and numerical cross-references (which Leonardo had already made use of in his geometric drawings). By means of text on his maps Leonardo identified locations, cities, mountains, and rivers; often he did this himself, but in his later years he left the task to his pupil Francesco Melzi, who sometimes used regular capital letters. Renaissance cartography, surveying techniques (which Leonardo probably learned, for example, from Leon Battista Alberti and then used for his famous map of Imola [fig. 44]),<sup>25</sup> large manuscript maps, and published editions of Ptolemy all served Leonardo as models for the relationship between text and image. It had been known from antiquity that virtual representations of geographic or cosmological space were superior to what can be seen with the naked eye. The appearance of a valley or a mountain chain can be deceptive to a viewer (because of atmospheric or perspectival effects), while a faithful cartographic representation reveals in their totality elements that might otherwise be absent when seen from a particular point of view.

For this reason Leonardo loved to think of his representations of human anatomy as a form of mapping, comparing his anatomical charts to Ptolemy's maps of the cosmos (Windsor, RL 19061, ca. 1510). Certainly the analogies between the macrocosm and microcosm, between the larger and the smaller world, between bodies of land and human bodies, lay at the heart of this idea, but by the time Leonardo wrote the introduction to his anatomical books, he must have been no more certain of the correspondence between human functioning (especially the circulation of the blood) and the laws that governed grand geologic phenomena. (See essay by Claire Farago.) Ptolemy's map, the "cosmografia del minor mondo," was above all an analogy for charting the voyage undertaken in the miraculous universe inside the human body. The process of coming to know this body resembled a journey across oceans as yet unexplored (not unlike Christopher Columbus's of just a few years earlier), and the task of the returning sailor was to trace the territory he had just discovered on a map in order to make it visible to those who had not seen it. Every voyage takes place in time, and Leonardo's odyssey through anatomical dissection was an anguished struggle against time, against the rapid deterioration of muscle tissue and the vascular system before

the eyes and under the hands of the anatomist. Drawings (from multiple points of view) thus succeeded in improving direct vision (just as does a map) because they preserved the details of the object even after it was lost to the corruption of the cadaver (Windsor, RL 19070v). In the extraordinary series of drawings of the muscles of an old man's arm, made on both sides of a sheet now at Windsor (cat. no. 113) and drawn from right to left, the descriptive texts concerning the functioning of the deltoid muscle "follow" the drawings in their physical rotation and are inserted into the empty spaces between them.

Words alone, as Leonardo writes in the text surrounding his sketch of the heart and a lung, are absolutely incapable of describing what the eye has seen (Windsor, RL 19071). The anatomical treatises then in circulation must have seemed inadequate to the artist, including Mondino de Luzzio's Italian edition of Johannes de Ketham's *Fasciculus de medicina*, published in Venice in 1493, which Leonardo owned and which was embellished with lovely woodcuts that had, however, only a decorative function (fig. 137). He found it necessary, instead, to "draw and describe" (Windsor, RL 19013v), and the value of the text was in naming the parts of the body and describing them. These descriptions accompanied the drawings and conveyed the impressions of the observer with greater accuracy. It is not accidental that we find Leonardo's most advanced reflections on verbal language, in which he sees potentiality and infinite variety, in his late anatomical writings (Windsor, RL 19045v). This kind of writing, far removed from orality, communicates across the distance of time and space. It also records an event, dissection, that Leonardo felt was truly revolutionary with respect to the ancient tradition of knowledge.

Even the peculiar characteristics of Leonardo's writing style have a metatextual dimension. This is especially true of the positioning of text on paper and of the delineation of the writing space itself, elements that can be interpreted only on a visual plane (figs. 41, 42). Everyone has noted that Leonardo wrote backward, from right to left, in what is often referred to as mirror writing because it can be easily read when reflected in a mirror. This manner of writing, which came naturally to a self-taught, left-handed person, was not entirely unusual among Renaissance artists (Raffaello da Montelupo is one example; see essay by Carmen C. Bambach). Originally Leonardo's calligraphic notes were placed next to drawings as isolated lines of text. As the mass of text increased and gained autonomy from the drawings (as, for example, in the sheets with descriptions of sea monsters and caves discussed above and, later, in Paris Mss. B, C, and A), the problem arose of where to put the text on a page that was conceived from right to left. As in Hebrew or Arabic manuscripts, the first page of the book for Leonardo was the last. (For this reason, Luca Pacioli recorded Leonardo's script as a form of secret writing.)<sup>26</sup> This reversal, both in the production and reception of the text, offered an alternative way of reading reality, following a reverse metonymic chain. A historian who traces the course of human history from the present backward does

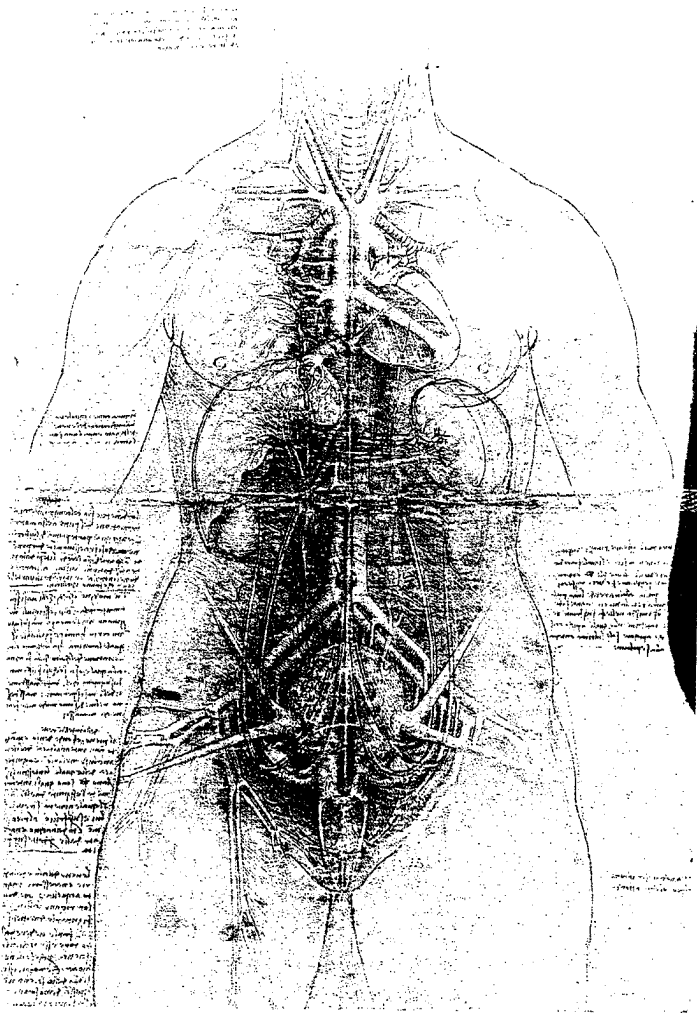


Fig. 45. Leonardo da Vinci, *Dissection of the Principal Organs and the Arterial System of a Female Figure (recto)*. Pen and brown ink, brush and brown wash, over black chalk, outlines pricked for transfer, 470 x 328 mm. The Royal Collection, H.M. Queen Elizabeth II, Windsor Castle RL 12281

much the same thing, as does the physicist or natural philosopher who analyzes a succession of causes and effects in natural phenomena or anatomy.<sup>27</sup>

Leonardo's *mise en page* thus gives much more freedom to writing than in the normal production of books, whether mechanically or by hand, in the age of humanism. Mirror writing might suggest that some of Leonardo's more finished drawings (the Windsor anatomical sheets, for example) were to be published by means of the new technique of engraving on a metal plate (Ma. I, fol. 199r).<sup>28</sup> Yet Leonardo's position on printing, the most important and revolutionary invention of his time, was unique. He reproached it for creating infinite offspring—*infiniti figlioli* (LDP, no. 8)—thereby almost anticipating the later concerns of Martin Heidegger and Walter Benjamin. The reproducibility of prints diminishes the aura resulting from a unique artistic creation, while Leonardo wanted instead to preserve the distinctive character of his work, even of his

writing and its textuality. Nonetheless, drawings like the *Vitruvian Man* and the female reproductive organs (figs. 43, 45) did become objects to be copied, though in these cases the method was the traditional one of pouncing. The latter was a true map of the human body, and it was destined to be reproduced like Leonardo's maps of the Arno or the Mugnone rivers (cat. nos. 78, 79).<sup>29</sup>

The book, reproduced by means of printing, also multiplies in its "infinite offspring" the idea of an end, a conclusion, or even death, which Leonardo's manuscripts constantly postpone. Their text is always in motion, the "books" (even when they are minutely outlined) remain open. Each text is an interchangeable form, able to combine in its parts with all the others, like the files in a hypertext.<sup>30</sup> Leonardo began, in the years of his second sojourn in Florence (from 1501–2 onward), to write on individual sheets of double-sized paper creased down the center that he left lying open on his desk, as if waiting to receive a continuous

resystemizing of knowledge, which came through rereading and transcribing in new manuscripts (examples include a group of sheets in the Codex Arundel, fols. 1–14; and in the Codex Leicester, cat. no. 114) and which in turn triggered a continuous cycle of writing, reading, and more writing.<sup>31</sup> Even if the separate sheets were eventually put together in the form of a book, they always maintain their sense of openness, as one can see in Madrid Codex II, in which the planning of the book was guided by a constant need to locate and to recover texts and drawings from what must have seemed labyrinthine even to Leonardo.<sup>32</sup>

The Codex Leicester, the subject of new and important research, is also relevant to a discussion of the relationship between word and image. At the same time it is impossible not to notice that writing predominates in the pages of this disassembled notebook and that much of it consists of transcribing and reworking earlier manuscripts. Leafing through its pages, one has the sense that space for writing was very carefully planned. This space is filled with script that spread, as one might expect, over the entire page in a single line, leaving the right margin free for notes and drawings. The drawings themselves are small scientific illustrations that synthesize the essential elements of their subjects using a technique perfected in the two Madrid codices. They are extraordinarily effective sketches, especially in the representation of the movement of fluids through water (vortices, waves, currents; see cat. no. 114; Sheet 11A, fol. 26v; Sheet 9A, fol. 28v; Sheet 5B, fol. 32r).

Leonardo's writing should be regarded more as a "textual window" than as a sheet filled with script. Even when it is not perfectly set on the page, the text—if it does not need to fit around a preexisting drawing or adapt to the shape of the paper, as in the case of a page in the Codex Atlanticus (fol. 694v, formerly fol. 258v-a) that is round—is always placed within a square or rectangular frame and justified at its margins. When the text came to an end in the middle of the last line of the "window," Leonardo felt obliged (especially after 1500) to add a somewhat quivering terminal line that sometimes looks like the recording of small seismographic tremors or the beating of a heart. Sometimes this type of line grew out of the "et cetera" that closed a sequence in the text and referred it back to a mental discourse indissolubly linked, in a physical and biological continuum, to the act of writing.<sup>33</sup> A normal feature of notarial and chancery script, the et cetera was virtually nonexistent in Leonardo's writing before 1500 but became much more common in his work between 1503 and 1508 (a period, as we have noted, of intense rewriting). It then appears on almost every page of the late manuscripts (Paris Mss. E and G) and the last individual sheets.

The fundamental point to be made is that Leonardo did not like to finish things. "Scrittura infinita" (infinite writing) meant that there were no boundaries between forms of expression, languages, intellectual disciplines, and experience. It also meant, however, not recognizing the act of separation that constituted the closing of a text, the conclusion of the argument, the final word. The limits of writing are the word, the line, the paragraph, the page, and the

book; those of the writer are the natural light of day or the artificial illumination of a lamp, his daily material needs (Leonardo's "la minesstra si fredda"), and his very life. This is so even when a single illusory victory of an "end" is achieved: "The night of Saint Andrew I found the solution to the squaring of the circle, and at the end of the light and of the night and of the paper on which I was writing it was finished, at the end of the hour" (Ma. II, fol. 112r).<sup>34</sup>

1. Arasse 1997, p. 136; Rosand 1988, p. 26.
2. "La prima pittura fu sol di una linea, la quale circondava l'ombra fatta dal sole ne' muri." English translation from Venerella 1999-, *Manuscript A*, p. 268. Herein LDP refers to the edition by Carlo Pedretti and Carlo Vecce of Leonardo's *Libro di pittura* (*Libro di pittura* 1995 in the Bibliography). Numbers refer to the passages in this edition.
3. "Il principio della scienza della pittura è il puonto, il secondo è la linea, il terzo è la superfizie, il quarto è il corpo che si veste de tal superfizie; e questo è in quanto a quello che si finge, cioè esso corpo che si finge, perché invero la pittura non s'astende più oltre che la superfizie, per la quale si finge il corpo figura di qualonque cosa evidente." English translation from Kemp 1989c, p. 15.
4. "Voi scrittori disegnando con la penna manualmente quello che nello ingegno vostro si trova." English translation from Venerella 1999-, *Manuscript A*, p. 277.
5. Vecce 2001, pp. 17-18.
6. "Il simile accade nelle bellezze di qualonque cosa finta dal poeta, le quali, per essere le sue parti dette separamente in separati tempi, la memoria non ne riceve alcuna armonia."
7. "Et in questo caso la pittura imitata da quella in gran parte supplisce, il che supplire non potrà la discrezione del poeta; il quale in questo caso si vole equiparare al pittore, ma non s'avede che'lle sue parole, nel far menzione delle membra di tal bellezze, il tempo le divide l'un dall'altro, e inframette la oblivione, e divide le porzioni, le quali lui senza gran prolissità non può nominare. E non potendole nominare, esso non può comporne l'armonica proporzionalità, la quale è composta de divine proporzioni. E per questo un medesimo tempo, nel quale s'include la speculazione d'una bellezza depinta, non può dare una bellezza descritta, e fa peccato contro natura quello che si dé mettere per l'occhio a volerlo mettere per l'orecchio." English translation adapted from Kemp 1989c, p. 24.
8. "Dilla in forma di frenesia o farnetico, d'insania di cervello." English translation from Kemp 1981, p. 163.
9. Rosand 1988, pp. 26-28; Zwijnenberg 1999, pp. 136-37.
10. Scarpati 2001, p. 16.
11. "O quante volte fusti tu veduto in fra l'onde del gonfiato e grande oceano, col setoluto e nero dosso, a guisa di montagna e con grave e superbo andamento! E spesse volte eri veduto in fra l'onde del gonfiato e grande oceano, e col superbo e grave moto gir volteggiando in fre le marine acque, e con setoluto e nero dosso, a guisa di montagna, quelle vincere e sopraffare. O quante volte fusti tu veduto in fra l'onde del gonfiato e grande oceano, a guisa di montagna quelle vincere e sopraffare, e col setoluto e nero dosso socare le marine acque, e con superbo e grave andamento."
12. Segre 1979.
13. Scarpati 2001, p. 12.
14. Scarpati 2001, p. 40.
15. "Con dolce mormorio," "alzato la coda e bassato le testa, e gittatasi del ramo, rendé il suo peso all'ali, e quelle battendo sopra la fuggitiva aria, ora qua, ora in là curiosamente col timon della coda dirizzandosi."
16. "Allora, rallegratosi il fo[co] delle sopra sé poste secche legne, comincia a elevarsi, [ca]cciando l'aria delli intervalli d'esse legne, infra quelle con ischerzevole e giocoso transito, se stessi tesseva. Cominciato a spirare fori di rilucenti e rutilanti fiammelle, subito discaccia le oscure tenebre della serrata cucina; e con galdio le

nammo: gli crescute scherzavano coll'aria d'esse circondatrice e con dolce mormorio cantando creava[n]i  
suave sonito.

17. Marinoni 1954b; Vecce 1993a; Vecce 1995; Vecce 2000.
18. Carlo Pedretti, *Postilla to Vecce 1993a*, pp. 313–16.
19. Vecce 2000, pp. 31, 34.
20. Vecce 2000, pp. 33–34.
21. Vecce 1998c.
22. Calvi 1925b, pp. 101–6.
23. Maccagni 1971; Vecce 1993b; Galluzzi 1997.
24. Gombrich 1986b.
25. See Zwijnenberg 1999, pp. 106–8.
26. Pacioli 1997, p. 334.
27. Holly 1996, pp. 116, 146.
28. Zwijnenberg 1999, pp. 83–85; Farago 1999a, p. 437.
29. Bambach 1999a, pp. 304–9.
30. Vecce in Pedretti and Vecce 1998, p. 50.
31. Zwijnenberg 1999, pp. 91–92.
32. Farago 1993; Farago 1999a; Zwijnenberg 1999, pp. 181–87.
33. Pedretti 1975b; Vecce 1998b.
34. “La notte di Santo Andre’ trovai il fine della quadratura del cerchio, e in fine del lume e della notte e della carta dove scrivevo fu concluso, al fine dell’ora.”