

LEONARDO ON PAINTING

*An anthology of writings by Leonardo da Vinci
with a selection of documents relating to
his career as an artist*

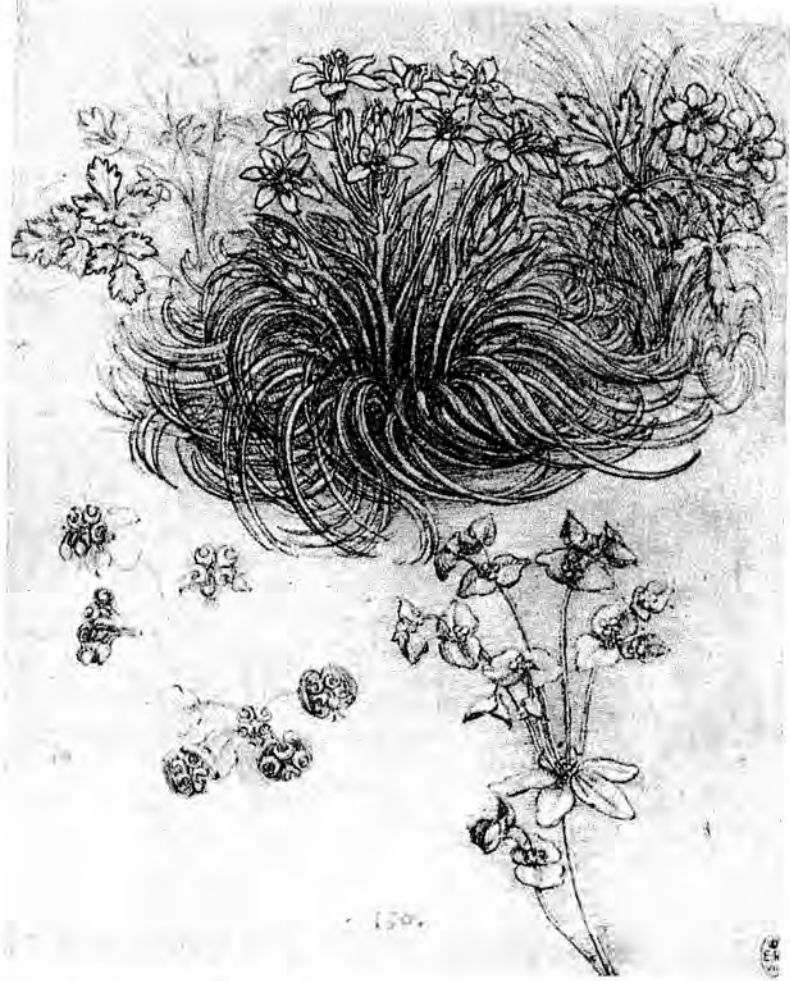
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2. Star of Bethlehem, Windsor, RL 12424.
 'Painting ... with philosophical and subtle speculation considers all manners of forms: sea, land, trees, animals, grasses, flowers ...'

THE SCIENCE OF ART

He who despises painting loves neither philosophy nor nature

If you scorn painting, which is the sole imitator of all the manifest works of nature, you will certainly be scorning a subtle invention, which with philosophical and subtle speculation considers all manner of forms: sea, land, trees, animals, grasses, flowers, all of which are enveloped in light and shade. Truly this is science, the legitimate daughter of nature, because painting is born of that nature; but to be more correct, we should say the granddaughter of nature, because all visible things have been brought forth by nature and it is among these that painting is born. Therefore we may justly speak of it as the granddaughter of nature and as the kin of god.⁹

Why painting is not numbered amongst the sciences

Because writers had no access to definitions of the science of painting, they were not able to describe its rank and constituent elements. Since painting does not achieve its ends through words, it is placed below the ... sciences through ignorance, but it does not on this account lose its divinity. And in truth it is not difficult to understand why it has not been accorded nobility, because it possesses nobility in itself without the help of the tongues of others - no less than do the excellent works of nature. If the painters have not described and codified their art as science, it is not the fault of painting, and it is none the less noble for that. Few painters make a profession of writing since their life is too short for its cultivation. Would we similarly deny the existence of the particular qualities of herbs, stones or plants because men were not acquainted with them? Certainly not. We should say that these herbs retained their intrinsic nobility, without the help of human language or writings.¹⁰

Whether painting is a science or not

That mental discourse that originates in first principles is termed science. Nothing that is part of science can be found within nature other than these, such as

continuous quantity, that is to say, geometry, which, commencing with the surfaces of bodies, is found to have its origins in lines, the boundary of these surfaces. Yet we do not remain satisfied with this, in that we know that line has its conclusion in a point, and nothing can be smaller than that which is a point. Therefore the point is the first principle of geometry, and no other thing can be found either in nature or in the human mind that can give rise to the point.*

If you were to say that the contact made on a surface by the very tip of the point of a pen would create a point, this is not true. Rather, we would say that such contact as this would actually be a surface around a centre and that centre is the location of the point. And such a point is not of the material of the surface. If all the points that are potentially in the universe were to be united – should such a union be possible – neither they nor a single point would compose any part of a surface. And given, if you were to so imagine it, a whole composed of a thousand points, and dividing some part of this quantity by one thousand, it may fairly be said that this part will be equal to the whole. This may be demonstrated by zero or nothing, that is to say, the tenth figure in arithmetic, which is represented by an '0', which is in itself nothing, but if it is placed after the unit it will make ten, and if you should put two after the unit it will make one hundred, and so on infinitely – the number to which it is joined always growing by ten times. But in themselves the noughts do not have any value other than nought, and all the noughts in the universe are equal to a single nought with respect to substance and value.

No human investigation may claim to be a true science if it has not passed through mathematical demonstrations, and if you say that the sciences that begin and end in the mind exhibit truth, this cannot be allowed, but must be denied for many reasons, above all because such mental discourses do not involve experience, without which nothing can be achieved with certainty.¹¹

Those sciences are termed mathematical which, passing through the senses, are certain to the highest degree, and these are only two in number. The first is arithmetic and the second geometry, one dealing with discontinuous quantity and the other with continuous quantity. From these is born perspective, devoted to all the functions of the eye and to its delight with various speculations. From these three, arithmetic, geometry and perspective – and if one of them is missing nothing can be accomplished – astronomy arises by means of the visual rays. With number and measure it calculates the distances and dimensions of the heavenly bodies, as well as the terrestrial ones. Next comes music, which is born of continuous and discrete quantities and which is dedicated to the ear, a sense less noble than the eye. Through the ear, music sends the various harmonies of diverse instruments to the *sensus communis** Next follows smell, which satisfies the *sensus*

communis with various odours, but although these odours give rise to fragrance, a harmony similar to music, none the less it is not in man's power to make a science out of it. The same applies to taste and touch.¹²

[Principle 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.¹³

Point is said to be that which cannot be divided into any part. Line is said to be made by moving the point along. Therefore line will be divisible in its length, but its breadth will be completely indivisible. Surface is said to be like extending the line into breadth, so that it will be possible to divide it in length and breadth. But it has no depth. But body I affirm as arising when length and breadth acquire depth and are divisible. Body I call that which is covered by surfaces, the appearance of which becomes visible with light. Surface I call the outer skin of a body, which defines the forms of a body and its boundary.* Boundary I call the surrounding edge of each seen surface, the termination of which marks the division [between one body and another].¹⁴

The second principle of the science of painting

The second principle of the science of painting is the shadow of bodies, by which they can be represented. We shall give the principles of shadow, with which we must proceed if we wish to model in three dimensions on the aforesaid surface.¹⁵

What is the first intentional aim of the painter?

The first intention of the painter is to make a flat surface display a body as if modelled and separated from this plane, and he who most surpasses others in this skill deserves most praise. This accomplishment, with which the science of painting is crowned, arises from light and shade, or we may say *chiaroscuro*.* Therefore, whoever fights shy of shadow fights shy of the glory of art as recognised by noble intellects, but acquires glory according to the ignorant masses, who require

nothing of painting other than beauty of colour, totally forgetting the beauty and wonder of a flat surface displaying relief.¹⁶

There are two principal parts into which painting is divided: firstly the outlines which surround the shapes of solid bodies – and these outlines require draughtsmanship; and secondly what is called shading. But draughtsmanship is of such excellence that it not only investigates the works of nature but also infinitely more than those made by nature . . . On this account we should conclude that it is not only a science but a goddess which should be truly accorded that title. This deity repeats all the visible works of almighty God.¹⁷

Of the ten functions of the eye, all appertaining to painting

Painting embraces all the ten functions of the eye; that is to say, darkness, light, body and colour, shape and location, distance and closeness, motion and rest.* My little work will comprise an interweaving of these functions, reminding the painter of the rules and methods by which he may imitate with his art all these things – the works by which nature adorns the world.¹⁸

How painting includes all the surfaces of bodies . . .¹⁹

The science of painting includes all the colours of surfaces and the shapes of the enclosed bodies, and their closeness and distance, with their due degree of diminution according to their degrees of remoteness. And this science is the mother of perspective, that is to say, visual rays. Perspective is divided into three parts, of which the first is concerned solely with the outlines of the bodies; the second in the diminution of colours at varying distances; the third in the loss of definition of bodies at various distances. Now, the first, which only embraces the outlines and contours of bodies, is called drawing, that is to say, the figuration of any solid body. From this arises another science, which embraces light and shade, or we may wish to say *chiaroscuro*, a science of complex exposition. From the visual rays, the science of astronomy has arisen, which is merely perspective, since it consists of visual lines and intersected pyramids.²⁰

There is no part of astronomy which is not a function of visual rays and perspective – the daughter of painting – because it is the painter through the requirements of his art who has given birth to perspective, in that he cannot manage without the outlines that enclose the varied



3. *Virgin of the Rocks*, detail of head of Angel, London, National Gallery.
 'The first intention of the painter is to make a flat surface display a body as if modelled and separated from this plane. . . . This accomplishment . . . arises from light and shade'

shapes of the bodies generated by nature - without which the art of the geometer is blind. The geometer analyses every surface circumscribed by lines using the figure of a square and every solid using the figure of a cube, and the arithmetician does similarly with his cubic and square roots. But their two sciences do not extend beyond the consideration of continuous and discontinuous quantities. The quality they cannot express is the beauty of the works of nature and the adornments of the world.²¹

Painting only extends to the surfaces of bodies, and its perspective extends to the increase and decrease in size of the bodies and of their colours, because anything as it is removed from the eye loses degrees of size and colour according to the extent of its remoteness. Therefore painting is philosophy, because philosophy deals with augmented and diminished motion . . . Or inversely we may say that the object seen by the eye gains such size and clarity and colour as the space interposed between it and the eye diminishes . . . Painting can be shown to be philosophy because it deals with the motions of bodies in the briskness of their actions, and philosophy too extends to motion.²² Philosophy penetrates within these bodies, considering what comprises their distinctive essences, but it does not remain satisfied with its truth as does the painter with his, which comprises the primary truth of the bodies, because the eye deludes itself less.²³

How the eye is less easily deluded in its workings than any other sense

The eye deludes itself less than any of the other senses, because it sees by none other than the straight lines which compose a pyramid, the base of which is the object, and the lines conduct the object to the eye, as I intend to show. But the ear is strongly subject to delusions about the location and distance of its objects because the images [of sound] do not reach it in straight lines, like those of the eye, but by tortuous and reflexive lines. Many times things that are remote sound closer than those nearby, on account of the way the images are transmitted; although the sound of the echo is referred to the ear only by means of straight lines. The sense of smell is even less able to locate the source of an odour. Taste and touch, which come into contact with their objects, can only gain knowledge from this direct contact.²⁴

Which science is most useful, and in what does its utility consist?

That science is most useful whose fruits are most communicable, and thus conversely that which is less communicable is less useful. The end results of painting are communicable to all the generations in the universe, because its results are a matter for the visual faculty. And they are not transmitted by the ear to the *sensus communis** in the same manner as things are transmitted by the eye. Therefore the eye has no need for translators from various languages, as have words, and it gives immediate satisfaction to human beings in no other way than the things produced by nature herself - and not only to human beings but also to other animals, as is shown in a picture representing the father of a family, which little children tried to caress even in their swaddling clothes, and similarly the dog and cat in the same household. It was an amazing display to behold.

Painting represents the works of nature to its sense with greater truth and certitude than do words and letters, but letters represent words to its sense with greater truth than does painting. But we declare the science representing the works of nature to be more marvellous than that science which represents the works of the worker, that is to say, the products of man, which words are, as in poetry and other similar things which are expressed through human language.

Of the imitable sciences

Those sciences that are imitable are of such a kind that through them the disciple can equal the master and produce comparable results. These sciences are useful for the imitator, but they are not of such excellence as those that cannot be passed down in this way as if they are heritable goods. Amongst these, painting has first place. It cannot be taught to someone not endowed with it by nature, as can be done with mathematics in which the pupil takes in as much as the master gives out. It cannot be copied as can writing, in which the copy has as much worth as the original. It cannot be reproduced as can sculpture, in which the cast shares with the original the essential merits of the piece. It cannot produce infinite offspring, like printed books. Painting alone retains its nobility, bringing honours singularly to its author and remaining precious and unique. It never gives rise to offspring equal to itself, and such singularity gives it greater excellence than those things that are spread abroad. Do we not even now see the greatest kings of the Orient going out veiled and concealed, believing their fame to be diminished by showing themselves publicly and divulging their

he would only do this in order not to lose the beauty of the world which consists of the surfaces of bodies, with their visual effects and actual forms as reflected in the human eye.³¹ A deaf man only foregoes the sound made by the movement of the percussed air, which is the least matter in the world.³² He who loses sight loses the spectacle and beauty of the universe, and comes to resemble someone who has been buried alive in a tomb in which he can move and survive.³³

Animals receive worse injury by the loss of vision rather than hearing, for many reasons: firstly, by means of sight, they find food with which to nourish themselves, as is necessary for all animals; secondly, through sight, they can appreciate the beauty of all created things, most especially those that arouse love. One born blind is never able to make good this deficiency through hearing, because he would never be able to judge whatever might be beautiful. For him there remains only hearing, through which he is only able to hear voices and human speech, contained in which are the names of all things to which names are assigned. Without the knowledge of these names it is possible to live contentedly, as is seen in those born deaf, namely the mutes, most of whom are able to find pleasure in the practice of drawing.

If you say that sight provides an impediment to sharp and subtle mental reasoning, through which insight is achieved into divine sciences, and that this kind of impediment led a philosopher to deprive himself of sight,* the answer to this is that the eye, lord of the senses, does its duty by obstructing all the confusions and lies which arise not in sciences but in those discourses undertaken with great commotion and gesticulation. Hearing, which remains most offended by them, should do the same, since it seeks an accord in which all the senses tally. If this philosopher plucked out his eyes to remove the impediment to his discourse, you may well consider that such an act fittingly accompanied his mind and reasoning, since they were equally insane. Could he not have closed his eyes when he entered such a frenzied state and kept them thus closed until his fury had abated? But the man was mad, and his ideas were mad, and none more so than the plucking out of his eyes.³⁴

The difference between painting and poetry³⁵

The imagination cannot see with such excellence as the eye, because the eye receives and gives the images or rather the semblances of the objects to the *imprensiva*,* and from this *imprensiva* to the *sensus communis*, where it is interpreted, but the imagination is unable to exist outside the *sensus communis*, unless it passes to the memory where it terminates and dies if the thing imagined is not of great excellence. Poetry arises in the mind and imagination of the poet, who desires to

depict the same things as the painter. He wishes to parallel the painter, but in truth he is far removed. . . . Therefore, with respect to representation, we may justly claim that the difference between the science of painting and poetry is equivalent to that between a body and its cast shadow. And yet the difference is even greater than this, because the shadow of the body at least enters the *sensus communis* through the eye, while the imagined form of the body does not enter through this sense, but is born in the darkness of the inner eye. Oh! what a difference there is between the imaginary quality of such light in the dark inner eye and actually seeing it outside this darkness!³⁶

Painting immediately presents to you the demonstrations which its maker has intended and gives as much pleasure to the greatest of senses as anything created by nature. And in this case, the poet who sends the same thing to the *sensus communis* via hearing, a lesser sense, cannot give any greater pleasure to the eye than if you were listening to something spoken. Now, see what difference there is between hearing an extended account of something that pleases the eye and seeing it instantaneously, just as natural things are seen. Yet the works of the poets must be read over a long span of time. Often there are occasions when they are not understood and it is necessary to compose various commentaries, and very rarely do the commentators understand what was intended by the mind the poet. And many times authors do not read out any more than a small part of their work through lack of time. But the work of the painter is instantaneously accessible to his spectators.³⁷

Painting presents its essence to you in one moment through the faculty of vision by the same means as the *imprensiva* receives the objects in nature, and thus it simultaneously conveys the proportional harmony of which the parts of the whole are composed, and delights the senses. Poetry presents the same thing but by a less noble means than by the eye, conveying it more confusedly to the *imprensiva* and describing the configurations of the particular objects more slowly than is accomplished by the eye. The eye is the true intermediary between the objects and the *imprensiva*, which immediately transmits with the highest fidelity the true surfaces and shapes of whatever is in front of it. And from these is born the proportionality called harmony, which delights the sense with sweet concord, no differently from the proportionality made by different musical notes to the sense of hearing. And yet hearing is less noble than sight, in that as it is born so it dies, and it is as fleeting in its death as it is in its birth. This cannot apply to the sense of sight, because if you represent to the eye a human beauty composed of proportionately beautiful parts, this beauty will not be so impermanent or rapidly destroyed as that made by music. On the contrary, it has great permanence and allows you to see and contemplate it, and does not need to be reborn in numerous

performances like music, nor will it induce boredom in you. Rather, human beauty will stimulate love in you, and will make all your senses envious, as if they wished to emulate the eye – as if the mouth would wish to suck it into the body, as if the ear would seek its pleasure from being able to hear visual beauty, as if the sense of touch would wish it to be infused through the pores, and as if the nose would wish to inhale it with the air that it continually exhales.³⁸

If you were to say that poetry is more enduring, I would reply that the works of a coppersmith are even more enduring, because time conserves them better than the works of both of us. Nevertheless, the coppersmith requires little imagination. And by painting with enamels on copper, pictures can be made more durable.³⁹ Time will destroy the harmony of human beauty in a few years, but this does not occur with such beauty imitated by the painter, because time will long preserve it. And the eye, in keeping with its function, will derive as much true pleasure from depicted beauty as from the living beauty denied to it . . . In this case, the painted imitation can provide a surrogate in large measure – a form of substitution that the poet cannot effect. In such matters the poet may wish to rival the painter, but he does not allow for the fact that the words with which he delineates the elements of beauty are separated from one another by time, which leaves voids between them and dismembers the proportions. He cannot delineate them without excessive wordiness, and not being able to depict them, he cannot compose 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 not possible 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. Let the effects of music enter through the ear, but do not send the science of painting that way, since it is the true imitator of the natural shapes of all things.⁴⁰

A poem, which has to accomplish the representation of a given beauty by means of the representation of each of those parts which would comprise the same harmony in a painting, does not achieve any more grace than music would produce if each note were to be heard on its own at various intervals, failing to produce any harmony – just as if you wished to show a face part by part, always covering the section previously shown. In such a demonstration, the concealment does not allow the composition of any proportional harmony because the eye cannot embrace all of it within its faculty of vision simultaneously.⁴¹

[Reply of King Mathias to a poet who vied with a painter]

On King Mathias's* birthday, a poet had brought him a work made to commemorate the day on which the King was gifted to the world, when



4. *Cecilia Gallerani*, Cracow, Czartoryski Museum.

*a painter presented [the King] with a portrait of his beloved lady. Immediately the King closed the book of the poet and turned to the picture, fixing his gaze upon it with great admiration'