

INTRODUCTION

A reconstructed or historical excursus on perspective in antiquity does not exist. Only a few important studies and compendia offer a general vision of the subject, and in any case they do not follow the logical thread of “catoptrics,” or the science of mirrors, that makes the concept of linear perspective comprehensible.

This volume attempts to produce a history of perspective in Greece and Rome, rendering the reader a participant in themes that have contributed to the development of perspective as a science. The themes will be traced through facts and events.

Theories related to the science of mirrors, though not commonly known, offer principles that have enabled mankind to portray three-dimensional space. The laws of catoptrics transformed the way mankind sees, with consequences in art and culture in general. This volume seeks to be a guide to both the scholar and the student who wishes to recognize fundamental continuities within a historical account of linear perspective, as it illuminates discoveries that lead from antiquity to the Middle Ages and from the Middle Ages to the Renaissance.

Linear perspective is a science that represents objects in space upon a plane, projecting them from a point of

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Rocco Sinisgalli

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view – that is, from a center of projection on a plane. That this concept was known by the ancients is clear and evident. It consisted of very precise rules of geometry that are based upon the science of mirrors. That science was studied by four great authors: Euclid of Megara (fl. 300 B.C.), who, in addition to the *Elements*, also wrote *Optics* and *Catoptrics*; the philosopher and Epicurean poet Titus Lucretius Carus (living in the era of Caesar and Cicero), who is the author of *De Rerum Natura*; the Roman architect Vitruvius (whose life spanned the first century B.C.), who wrote *De Architectura Libri Decem*; and the astronomer and geographer Ptolemy, who, in a treatise called *Optics* (written toward the middle of the second century A.D.), confirmed the science of mirrors as the basis of pictorial representation.

The Latin word *speculum* signifies “faithful reproduction,” or that which reproduces reality. It led our ancients to invent the term *consulere speculum suum* (interrogate your own mirror), found in Ovid’s *Ars Amatoria*,¹ in their quest to see if things really correspond to a natural truth.

In Latin, words derive in great part from their roots, which are small and irreducible. All the terms that have their origins in the same root together form a so-called family of words. Latin grammar teaches how the formation of substantives derives from the roots of nouns, adjectives, or verbs to which suffixes are added. These suffixes are of extreme importance for understanding the meaning of a word. Thus the suffix *-ulum* of the word *speculum* indicates the creation of an instrument or a means. And because the root *spec-* derives from the verb *specio*, which means “to look,” and the suffix *-ulum* serves to determine or to specify the idea expressed by the root, the term *speculum* indicates “the instrument (or the means) necessary to observe (or to look).”

The term *imago*, as the *Rhetorica ad Herennium* explains,² “is the comparison of two figures that have between them a certain resemblance” – which can be perfectly equal, if reproduced in a mirror, as Seneca confirms in *Naturales Quaestiones*,³ when he states, *imago similis reddi debet e speculo*.

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This was certainly not the case if the Edict on Prices, issued in 301 by the emperor Diocletian (243–313), took into consideration two kinds of painters: the *pictor imaginarius*, that is, “the painter creator of images,” or he who creates them by tracing their design on paper, establishing the structure of the composition, and suggesting the colors; and the *pictor parietarius*, he who adapted the form and the proportion of the design to the painting or to the wall on which the design was to be executed.

As we already noted, the mirror was also used to effectively paint pictures or images: Pliny the Elder confirms this when, in the *Historia Naturalis*,⁴ he recounts that the painter Iaia of Cyzicus, who lived in Rome at the time of Marcus Terentius Varro, painted her own image by using a mirror.

The *Catoptrics* of Euclid and the third book of the *Optics* by Ptolemy teach how to reproduce upon the mirror plane the images reflected within it. These are subjects at the foundation of modern perspective.

The words *perspectiva* and *prospectiva* appear only in the late Latin of the sixth century A.D., found first in the work *Analyticorum posteriorum Aristotelis interpretatio* by Severinus Boethius (476–524) and second in the Code of the emperor Justinian (483–565).

It is evident that at the base of both *perspectiva* and *prospectiva* there is always the root *spec*, preceded this time by the prefix *per-* or *pro-* and followed by the suffix *-tiva*. The prefixes *per-* and *pro-* indicate respectively “through” and “in conformity to,” while the suffix *-tiva*, as Latin grammar tells us, indicates that the adjective *per-spec-tiva* derives from the verb *specio*, indicating the “qualities” found within the root and the prefix. Specifically, these are the qualities of “seeing through” or of “looking in conformity to” something.

The Romans of the Republic or the Empire did not need to use the words *perspectiva* or *prospectiva*: they used the Greek term *scenographia*, as we will see in Vitruvius, in order to realize scientifically – that is, in conformity with the science of mirrors – the correspondence of architectural representation

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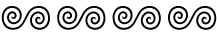
to the real. They used instead the word *imago* to indicate the correspondence to the real in the creation of pictures or wall paintings in conformity to the images produced in mirrors.

But all the magic and wonder that mirrors provoked in the ancients are easy to discover in the deep significance found within the two terms “mirror” in English and *miroir* in French. Conserved within these two languages is not in fact the idea of the perfect image found in the word *speculum*; instead, what has remained is the idea “to look with astonishment.” This is the true meaning present in the Latin verb *miror-miraris*, from which Britannic “mirror” and the French *miroir* both derive.

It is evident that, then as now, images of oneself, of others, and of any other object present in nature aroused a sense of marvel, amazement, and admiration. These images were reproduced in all their three-dimensional reality by a simple mirror.

Man, at least in Western civilization, has always attempted to realize the image in the mirror. And one thing is certain: beginning with Euclid’s contemporaries, any painter, educated in the science of vision and of representation, would have been able to apply the principles present in the geometric, mathematical, and pictorial catoptrics by the great geometrician – principles that are at the basis of modern perspective.

This attempt is fundamental for understanding Greek and Roman painting.



CHAPTER ONE

THE ANCIENTS AND
MIRRORS

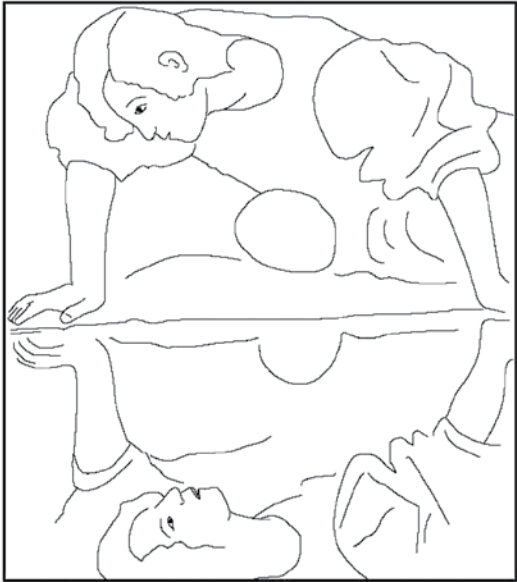
1. THE IMITATION OF NATURE

That which today we call “perspective” may have been an early-recognized need tied to the very life of man, to his existence. We are speaking about the representations of one’s own image, of others, and of all the objects that surround them. The reflection of one’s own image in a liquid may have been initially astonishing, particularly when the viewer touched his face and saw the corresponding image.

The process of recognition, or rather the self-awareness of one’s own image, may be at the root of the search for linear perspective.

On one side there were a man’s face and his body, along with the objects that surrounded them, including the space above the earth in the sky. On the opposite side there were the images of his face, his body, and all the other real objects, including the infinite space between the earth and the sky, which would move at the first movement of his own gaze. Again, it came spontaneously to man to touch the water with his hands, incredulous that it was all purely an appearance.

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1 The mirror and the painting. Facsimile drawing of Narcissus, by Caravaggio, Galleria Barberini, Rome (1599–1600).

The myth of Narcissus, narrated by Ovid (43 B.C.– A.D. 18) in the third book of the *Metamorphoses*,¹ recounts how Narcissus fell in love with his own image. The story indicates how the phenomenon may have interested the imagination of the ancients, poets and writers, in an attempt to explain that images were only illusions (Fig. 1).

2. THE DOUBLE

The earliest intuition was that the image in water reproduces reality as it is, in which the image seems objective and credible.

A second intuition was this: when Narcissus painfully dies, he realizes that he can never love or possess that image. Behind the water’s surface a second Narcissus does not exist. That double is only virtual. It has the consistency of a phantom that is equal to the real one.

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3. THE MIRROR AS AN INSTRUMENT FOR
LOOKING AT ONESELF

But water was only the first instrument to offer man the great opportunity of seeing his own image, as well as those of others and of all things. Owing to his innate love of himself – recounts Seneca (4 B.C.– A.D. 65) – man was pleased by the sight of his own image.² Soon he went searching for other means to procure images to satisfy this desire more easily, for water could offer such viewing opportunities always and only upon a horizontal surface over which a man could not always bend or stretch in order to observe himself. Another problem with water was its unstable condition, since it was almost always in motion.

Soon man found that he could produce images with metals (bronze and silver) and stone (marble), once they were adequately worked, smoothed, or polished to a shine. These materials were brilliant and produced the same effects as water.

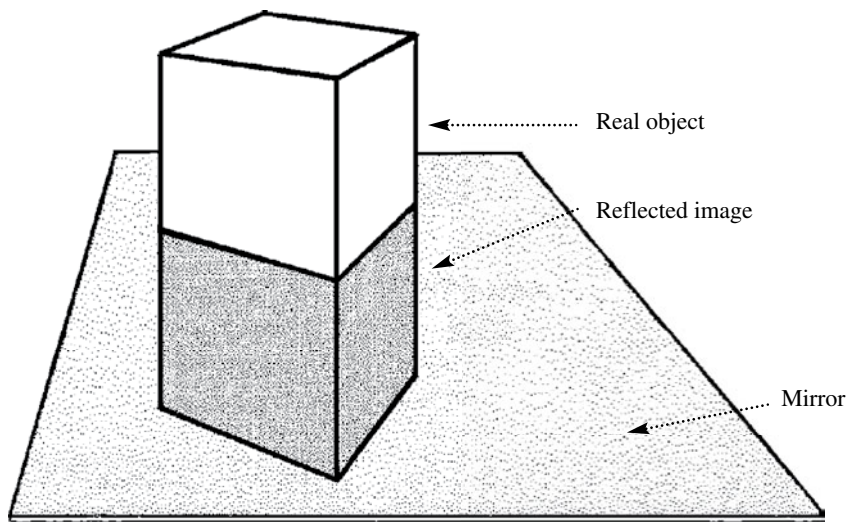
First in Egypt and then in Greece, metal mirrors appeared. Later the Etruscans advanced in the production of these magical objects, starting in the sixth century B.C. More than three thousand mirrors remain from these people, usually disc-shaped with a handle and cast in various forms, and today they are exhibited in numerous museums.³ Some of them are incised on their reverse side with decorative scenes similar to the artistic themes of painting, as if to remind us that such marvelous instruments intend the reproduction of reality or of everyday life.

In the end it was the Greeks and the Romans who constructed mirrors of all kinds just as we have today. A great scientific revolution had taken place: man had an instrument with which to look at himself and to admire the world.

4. THE FIXING OF THE IMAGE UPON THE MIRROR

A second great revolution was born from the first one. The Greeks and then the Romans felt the necessity of fixing the

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2 The mirror 1.

mirror’s image in order to immobilize it. This search was one of the first conducted by man that was both scientific and artistic. The goal consisted of the acquisition of the image in conformity to a reflection in a mirror (Fig. 2).

Let us keep in mind that this goal coincides exactly with that of the construction of linear perspective. The replication of reality, or of nature, is a desire recognized by both the Greeks and the Romans. These two civilizations acquired this ability in both sculpture and painting not only through attentive observation (as has been believed till now) but also through precise scientific laws that regulate the distance between objects. These are the laws of modern linear perspective, which are relative to the diminution of objects as they progressively recede.

The Greeks and the Romans rendered objective the desire to imitate nature by operating in conformity with a theory of flat nondeformed mirrors and not in conformity with the simple observation generated by the eye. In this manner, they succeeded in fixing the image in conformity with the rules of the mirror, as is now done with photographs.

THE ANCIENTS AND MIRRORS

The Greeks and later the Romans knew the immutable principle of perspective distance reduction through the rules of the mirror and the great science of “geometry.” This science would be used by philosophers and scientists and by painters and sculptors to such a degree that Plato (427–347 B.C.) had a motto written above the doorway of his Academy: “Entrance not permitted to he who knows not geometry.”

In the paragraphs that follow, we will attempt to understand what the art of “perspective geometry” was for the Greeks and Romans. This art consisted, and consists still, in the projecting, by means of rays, of the single points of an object and in the sectioning of the same rays by means of the mirror plane, a plane that coincides with the picture plane in perspective.

5. THE IMAGES OF SOCRATES AND PLATO

The most significant references in relation to seen figures, considered as reflected images that are reproduced by water, can be found several times in Plato. In book VI of the *Republic*,⁴ Plato has Socrates (469–399 B.C.), the greatest of philosophers as well as his master, state what is meant by images. He considered the images to be shadows generated by fire, those which, at the beginning of book VII in the *Republic*, are projected onto the wall of a cave, just as those images are reflected in water or in opaque bodies that are smooth and shiny. All this is done in order to affirm that the visible world may be divided into the true and the false, the real and the fantastic.

In book X of the *Republic*,⁵ Plato speaks of images reproduced by means of mirrors. He states that if one takes a mirror and turns it from side to side, it will quickly reproduce the sun, the stars, the earth, ourselves, other living beings, furniture, plants, and every other object. In these passages cited, as well as in others, Plato is simply repeating the concept of reflected images. He takes into consideration the correspondences between these images and the real “model.”

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Then, in the *Sophist*,⁶ he states precisely that we will call “images” not only what are reflected in water and in mirrors but also those things which are “painted” or “modeled,” associating, with these two adjectives, the images that are present in the arts of painting and sculpture with those that are reflected.

6. IMAGES REFLECTED IN WATER

Even richer with meanings is the comment we may read in the sixth book of the *Republic*.⁷ Here Plato has Socrates say of “the experts of geometry”:

1. They discuss images by constructing and designing them, as if they were images reflected in water.
2. They make use of those forms, since they search to grasp the reality that is seen through reflection.

From these statements of Plato, we know with certainty that the ancients drew images, or rather constructed them, at least beginning from the first years of fourth century B.C., the period in which the *Republic* and the *Sophist* were written.

Therefore, drawing the images meant, at least for Plato and his contemporaries, seeing and considering them as conforming to models: the real one – naturally on this side of the water’s surface – and the virtual one beyond the same surface.

This virtual model corresponds to the first, although Plato, through his allegory of the cave⁸ mentioned earlier, underscored that the virtual world is unreal.

Thus, as Plato has indicated to us, the real image for the ancients was only that which was reproduced by reflection upon the flat surface of water, because only those images are the likeness of objective reality.

We will identify this representation of natural reality as reflected upon the surface of water with the name of “the classical image of reality,” because it is inspired by the ideas of the great philosophers of antiquity.