

About "Plato's Cave"

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" Imitation is, therefore, away from truth, and if it moulds up all the objects it is as it seems, only because it respects a minimum portion of each one of them, which is nothing more than a shadow."

Plato, Book X, *The Republic*

Abstract

Every investigation is vivified through the constant search for sublime. The development of a mimetic illusion goes until the limit of the virtuosity allowed by each techniques related with its own time. Man wants to feel himself as being the *Nature's Pencil*¹. However, in the application of new working methods, what could be expected from each one remains on a lower level comparing with the discoveries based on themselves.

In this paper, based upon an historical evolution of the methods, means and representational spaces, we would like to stress that *Virtual Reality* is a decisive step to the conquest of the perceptive space. Man, throughout his life, operates the reality in different ways, feeling always the need of immersing in the representation of the surrounding reality. Therefore, it is

¹ *The pencil of Nature (1844-46)* Is the title of a book by Fox Talbot, one of the photograph's pioneers.

important to settle down the effective conscience of the trajectory, described by the human geniality during the conquest of representational processes to create illusions of the reality.

1 INTRODUCTION

When the utensil became instrument² and the plain surface has offered itself as a support, the spirit, the eye and the hand could finally converge to the translation of the already seen into the new visible. It was always man's intention to produce images which he intended to be close to the visible ones. He always wanted to cause the effect of impression of the reality. Nevertheless, the man soon realised that the technical means available were quite limited. In other words, the image as an equivalent is determined by its environment in which it is expressed. Therefore, any system or method that represents the real is, certainly, another step into ingenious artifice of the illusion of the senses; visual, tactile or audible. Such an advance in the illusive process was always due to a convergence between human geniality and scientific techniques.

We believe that the cavern men's amazement before parietal paintings was certainly the same that was caused by the paintings of the Greek Parrhasius, the panels of Brunelleschi, the daguerreotypes of Mister Daguerre, the first film projection by the Lumière Brothers, the first television live program or the first virtual environments. Let it be the écran, a wall, a *vetro tralucente*, a projection panel, a monitor or the retina itself one thing is for sure: they all support images of great amazement.

2 THE REPRESENTATION AND SPACE APPROPRIATION

Since Lascaux, man make an effort to control the real. Initially, because he could reproduce it, he had a gift of magic and repetition. The magician-artist can draw certain objects many times as he wishes. He could reinvent the real, but he has always been restricted in participating on the created environment. The drawing materialises the retina image and gives physical existence to mental image, convergence point between the sensitive and the intelligible. Parietal images, the first inventory of the world, are remarkable testimonies of the changes and the new knowledge of Palaeolithic man. As Bergson decidedly claimed, it was in prehistory and due to "intelligence, a step into the original", that "the capacity to manufacture artificial objects, in particularly tools to make tools, varying indefinitely the manufacturing" (Bergson, 1911) was prototiated.

² One must clarify the distinction that it is made in our work between *utensil* and *instrument*. Utensil must contribute to external actions, while instruments are sued to adequate sensorial perception to phenomenons, allowing a better observation off things.

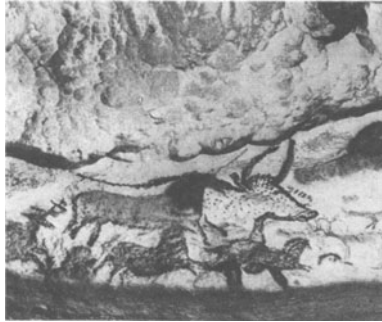


Figure 1 Lascaux caverns - France (about 15.000 a.C.) (Gombrich, 1989).

It was in Greece culture, as the cradle of the western culture and also a culture of the image, that the representation's *aporia* had an enormous liveliness. All art in ancient time is founded on a *model*, or *idea*, as Plato says, which can be placed in front of the artist or simply, the artist can have it in his mind (Seneca, 1991). Every time the artist copies the model he evidences its truth, that means, he certifies its consistence and allows a model's better knowledge. In representation, once we are limited to the plan, it becomes impossible to "reproduce" or "copy" the things. We can only execute an *imitation by simulacrum*. One example of the reproduction of "equivalent" signs or simulacrum is the painting of grapes' bunches from the Greek Parrhasius: This painting has such a skilfulness that it is said that real birds would attack it, thinking those bunches were real.

In his book, *The Sophist*, Plato defines two forms of *imitation*: a copy as reproduction of the real in its proportions of length, width, depth and suitable colours and, *simulacrum* towards something resembling the thing when it is seen from a unfavourable position. Maybe this critic was not only addressed towards painting, as one clearly understands by reading the mentioned excerpt. It certainly was also addressed to the famous Phidias statue's question: the inferior part of the sculpture was too short when seen at close distance but its dimensions seemed correct when it was placed on the level of the sight³. This episode shows the importance of the artifice, in what concerns the subjectivity of vision. In reproducing the external shape, the model is built not only by the relation with the real object, but mainly through the way in which the object will be perceived.

From Roman-Hellenistic culture came the idea of representation as a consequence of the object's real image seen by the artist. The real image itself is no longer considered. Plotinus

³ According to Pliny, Alcamenes and Phidias have on a building of a statue of Athena. This statue was to be placed on a column: Phidias made an elongated and apparently deformed figure, that was judged as inferior to the one of Alcamenes but, when Phidias statu was placed on the pedestal, it was the one that gare the better seeing thanks to counter-perspective effect.

Neoplatonism⁴ reassures this idea which would influence all representation in most Middle Ages and Renaissance through Alberti's philosophic reflections. Nevertheless, in Seneca's *epistulae morales* it is still indifferent the fact that imitation can born from an "idealised" and interior image or from a natural object.

Christianity brought a generalised movement in western world, a movement of symbolic representations which were absolutely esoteric and which evoked a superior and super-sensible reality. Generalised disinterest towards sensible was settled. Consequently representation broke with the process of life — abjection for the visible — and stopped working with materiality and "physical supports", becoming an aprioristic and privileged way of subjective experience, a support of diffusion of the masses' feelings.⁵ If in Ancient time the Gods participated in daily life, becoming promiscuity between mythology and humanity a commonplace, in the subsequent historical period an hierarchical superior world was elected and any event of the under-world was attributable to divine will. Every representation on this period is "more a symbol than an image, more a convention than a vision" (Murtinho, 1993).

As a result, any biblical image has an implacable, mesmerising effect. It is a kind of open window below Heaven and it maintains an exclusive relationship with the divine, through spiritual and doctrinal contents. Such is the reality creatures conceive and try to explore.

When Giotto, a Florentine painter used a natural scenery on the life of S. Francisco, he proposed a sensitisation of the visible in what concerned representation. Maybe because that whole scene was somewhat contemporaneous — it is said that Giotto actually met S. Francisco — it produced great astonishment which resulted from a big similitude between figures and real persons. Images are not allusive: they are solid, tangible and vigorous in expression and gesture. S. Francisco was "in fact" S. Francisco (Battisti, 1990). The naturalistic quality of Giotto is attested in post-classic art, on introducing "the insect that deceives in the eyes"⁶.

⁴ About Neoplatonism and Plotinus, we suggest the reading of "*Le Neoplatonisme*" from Jean Brun PUF, France, 1988.

⁵ In Arras Council (1025 b.C.) the aims of painting are: the catechetical, the historical and the aesthetic ones. From here a maxim is born, the same one that would justify christian themes: *Quod legitibus scriptura, hoc idiotis pictura* (Painting is a way of bringing God's word to the illiterate people).

⁶ According to Vasari on his *Vites*, Giotto would have painted on a nose of a recent made figure by his master Cimabue — a fly, which was tried to be repeatedly performed by his master Cimabue. This quality of a notable performer is certainly the one which is exalted on Dante's (*Divine*) *Comedy*.



Figure 2 S.Francisco - Giotto (1296-1297) (Battisti, 1990).

A century later, Filippo Brunelleschi, while elaborating a pair of panels representing *Baptistry* and the *Palace of the Landlord*, achieved an unequalled deep, through a precise and attentive study of reality and through rigorous geometry: with the aid of a fixed mirror and the look on a certain determined point, the image of the real reflected on that mirror would be the image of the painting itself when reflected on the mirror. Certainly, these were images of amazement.

The mirror will acquire a strong demonstrative slope, giving, in practice, a comparison between the real shape in space and the seen shape. *In principio erat speculum...*

Through images, pictorial or specular, life and the world become duplicated. The mirror is the judge. Only with "the judgement of the mirror" (Hollanda, 1549) can the validity of the relationship be determined: "if you want to see if your painting faithfully reproduces the real, you take up a mirror and try to reflect the living thing on it, and then you can compare this image with your painting. You must pay attention if both are in compliance with each other." (Vinci, 1943)

Renaissance brings the attraction by reflection on nature and the observation method as a real way leading to science. Representation offers direct relations between the objective real and its registry seen from a particularly point of view. Man sees the world depending on his knowledge, and it is with his own knowledge that man represents it.

Objective illusionism is the underlining form of affective communion — *empathy* — and it is an accomplice between man and the world. The artist shares the experience he had with the visible and awakes the energy of seeing. The Albertian *vetro tralucente* allows the representation of things and perspective is the exact method leading works to *perfezzione*; that is the universal judgement. Representation covers the reproduction of reality or the projection, as an anticipation, of a reality to come. Painting rectifies life and the world and it is a means of triumph over nature. Therefore, "the second way of the Renaissance which would represent the art's decisive moment in a process of conquest of perfect composition, carries itself the seeds of distrust over the value of objective rules. These rules would generate the interest on pretended representation of the space. Now it is the *art of pretending*. That is when Leonardo da Vinci begins the process of discovering the psychology of shapes" (Tavares, 1994). The *trompe-l'œil* effect and its simulated architectures propitiate a transparency illusion of the screen and the ephemeral stupefaction of look.

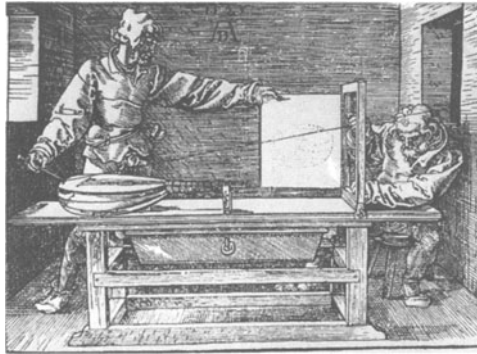


Figure 3 Albrecht Dürer (1525) (Wright, 1983).

Inexorably, the insatiable appetite of vision leads to certain limits, such as laboriously perspectives founded on the most vigorous geometric constructions of, for instance, Paolo Ucello. Another example is met on Albrecht Dürer. He tried to build entangled projection mechanisms of body figures on a plain surface; mathematization of representative constructions or the elaboration of artifices which materialise the visible experience. However, as Panofsky showed in a well-known essay (Panofsky, 1927), perspective is a *symbolic* — or conventional — *form* of representation of a retinical (spherical) image on a plain surface (Panofsky, 1927). Consequently imitation is a "cultural codified" process which presupposes "a relationship of equivalence or *similitude* between image and imitated object" (Modica, 1992).



Figure 4 San Romano Battle (1450) (Gombrich, 1989).

Karl Popper’s pertinent critic towards David Hume’s belief in science infallibility recognises the provisional value of conclusion. Science is not an absolute truth, but it is the absolutely relative truth. Available technology constitutes inevitably a formulative limitation. Interpretation or representation are conditioned by the previous knowledge of the thing and the world. That is why one can understand Kepler’s definition: “vision is produced by the painting of the visible thing which builds up itself on the white and concave retinic wall.”⁷ Certainly three centuries later Kepler would compare vision to photograph but in his time painting was the art drawing near retinic image.

On seeing, mixed with the will to observe, visibility must take its place, “*painting itself on the receptive surface of the retina though the action of the most insignificant, colourful light brushes*” (Frade, 1992). Kepler, taking his *camarae obscurae* as a model of vision, observes the most fundamental act of vision and his *mechanic eye* enables the tracing of the *imago rerum visibilis* captured on the inside of the equipment.

When Niepce and Daguerre succeeded in a chemical fixing on a sensible emulsion, that means when they invent the photograph film, they gave viability to the promise of infinite duplication of world’s appearances through the simple action of a shaft of light reflected on a support. Photographic images soon become a certain type of objects virtually omnipresent. Photograph, almost obligatory in modern society, becomes the most comfortable way giving

⁷ In the original, “*Visio igitur per picturam rei visibilis ad album retinae et cauum parietem*”. (Kepler, *Ad Vitellionem Paralipomena quibus astronomiae pars optica traditur*, 1604; Extracted from *Figuras de Espanto*, Pedro Miguel Frade, Asa Edições, Oporto, Portugal, 1992, p. 37).

access to the world; photograph is the proof which satisfies visibility, the certificate of existence and the guarantor of authenticity. It is a miniature and a fragment of the world. The camera imposes, according to Moholy-Nagy in *Photography Film* (1925), *the hygiene of the optical* and it eventually *limits our standard of pictorial and imaginative association which was recorded in our vision by great painters* (Sontag, 1986).

Each image propitiates a revelation that gives us back the lost vision⁸; the vision is the omnipresent witness. Fixed images work as captured experiences, where the camera is the privileged instrument on the acquisitive act. Image establishes an obvious relationship of similitude with the referent, and it is, therefore always a presential symbolic form. Humanity, *hopelessly attached to Plato's Cave* — as Susan Sontag declared — *begins to delight itself with images of truth*.

However, the discoveries in the field of the technologies of visible unveil the possibility of motorization of the snapshot⁹ — 17 images per second and later 24 images per second allowed an optical illusion on film projection. *The art of the engine* is the possibility of reproduction in its real time. The effect is born when the rhythm of the succession of images makes an image appear while a precedent image is still recorded on the sensorial impression of the retina. Still, in the translation of the illusion of movement, a steady dimension is always necessary. Movement is a relationship between phenomena: movement exists because fixed points also exist.

The first projection of the history of film making, *L'entrée du train en gare de Ciotat* by the Lumière brothers, projected in the Salon Indien in 1895 frightened the audience before the optical illusion, nowadays risible, that a locomotive was precipitating towards them. Certainly the audience didn't feel outside the action when confronted with a mechanical transposition of the external world to the screen. Initially, it were the places of the images with the images of the places which amplified and rectified our vision of the world.

Also Vladimir Zworyki's *Iconoscope*¹⁰ was, according to him, a means to raise vision, but it soon became a precise means of communication of the masses. With a sender, a receiver, broadcasting by Hertzian waves to a long distance, image can reach even the most recondite place.

⁸ More than twenty years over the mission of Apollo 11, Edwin Aldrin confessed that he remembers more clearly his mission to the Moon through the pictures that immortalized the event than what he saw with his own eyes. The adventure belonged him more intimately because it had been transformed into a patrimony of Humanity than a patrimony of his own.

⁹ Long before cinema appeared, experiences on the persistence of the retinic image had already made — the first experiences were made in the end of the 10th century. From this experience, Joseph Plateau, a Belgian physicist, invented the *phenaquistiscope*, in 1832, which allowed to vision the illusion of movement through a minimum of ten images per second (in *Histoire du Cinéma*, Gérard Betton, Presses Universitaires de France, 1984).

¹⁰ Iconoscope is the first designation to electronic television. It was invented by Vladimir Zworykin and presented the first time in 1933.

The television set is the *witness lamp* which one can switch on and off in order to see the "transparency" of the world. The speed-limit of electromagnetic waves guarantees a transmission in real time; video is no longer the most modernised representation of the fact, but a live presence of the place (Virilio, 1990).

Side by side with sensible reality, there is from now on the presence of a *telereality*. In the *box that changed the world*, the real is a reference of a non-thinking reality. From an epistemological point of view, truth was guaranteed when the things had its presence before the eye. *Video* gives visibility and the potential presence and also the abolition of the distance. In the *cone of the visibility of appearances* one has a vertigo of the revelation of the extensive space.

The *video*, as Paul Virilio said (Virilio, 1990), is the active participation in the constitution of an instantaneous and interactive localisation of a new concept of "space-time", which has nothing in common with the topography or Euclidian geometry, but with implications on the vision and perception of the world.

The live tele-vision on planetary scale depends on the performances of the satellites. The speed of the events and the fact that they reach us in real time — remember, for instances, the war of the Gulf — place doubts in the concept of reality. For a long time, the idea of reality was a slow process of progressive assimilation. The idea of the real is mostly a presential genesis. One must still see before he believes. With the acceleration of time and mutations, and the dematerialization of informative supports, the concept of static reality does no longer functions. There is a crisis in the concept of reality and a loss towards the value of experience. The image is more and more the opium of the world. Solid world is more and more a fluid world.

3 VIRTUAL REPRESENTATION OF REALITY

It is clear that modernity brought the rupture with the idea of reality legated from the past: the idea of a space and homogeneous and isotropic time in which lays down a reality well implanted in the solidity of the materials of which objects are made (Manzini). Contemporaneity consecrate vulgarisation of instruments such as the photograph or television. Systematic intimacy with a simulated reality, daily apprehended alters the idea of things. The idea of things is constructed not upon a physical reality but, most of times, upon images.

Since the primordium, the real thing representation was always subordinated towards its own image — see, for instances, the unfruitful efforts on the Plato's model. Never in history was the thesis of Feuerbach on its 2nd edition (1843), *The Essence of Christianity* so actual. This thesis makes a critic of the society of the 19th century, because it "*preferred image than the thing, copy than the original, representation than reality, the looks than the being*" (Feuerbach, 1992).

Nowadays, images are considered substitutes or interpretations of things. In this sense, images are of two types: one, considers image as an emanation (of light waves or shafts) or as a material vestige (kind of trace); the other sees image as a representation or a simulacrum.

One example of the first type are photographic or *video* images; objective painting or computer environments are examples of the second type. Through images such as photographic ones, one looks for a substitute for the world, while through artificial images, such as cybernetic images one tries to build a substitute world.

Image and thing are two different forms of existence. Therefore, or the thing remains itself because coincides with the object, or the image is the object, despite referring to referential object. The presence of image appeals for a memory effort this means that every time we are confronted with a certain image, its nature-sign is directly proportional to our subjacent or pre-existent culture. The richer our information remains, richer will be its decodification. An image simply by itself doesn't mean anything.

Our experience in inhabit the world tells us that the truth is transmitted by our senses. The act of seeing, listening or feel converge to a redefinition of the visible and the sensible. Our coupling to the real world is made through sensorial organs. It is through the senses, mainly through vision, that a way of access to the world is propitiated. "In experience things are no longer subjects of vision; they become *seen things*. What we call vision belongs, now to the potency of thinking which attests that this appearance has answered to our eye's movements" (Merleau-Ponty, 1992). In vision, man is not aware of the eye; things come straight into his brain. Therefore, our vision is not wide, what we see are merely perspectives, and *our reality*, as Descartes pointed out, *is the thought*.

Greek culture's imagetic axiality, as Umberto Eco said on an interview to the *Nouvel Observateur*, made intelligence go through an intuition of the image. Things and the world are the *object* of thought. Also, Knowledge is based on a visual process, even on a visuality of abstraction: reasoning. The great divulgation of painting in the Middle Ages was a way of bringing God's word to illiterate people. One must make a critic at this point because the spiritual must not necessarily be translated into images, or internal images materialised in external images. "The power to create needs a point of support the crutch of reality" (Pessoa, 1986).

In virtual systems, visual sensations and physical stimulus converge to the effect of reality. The new Virtual Reality Systems problematize concepts such as: the exterior and interior, mental and material. Cybernetic simulacrum cancel the epistemological difference between the concepts of exterior and interior. They interiorize any form of exteriority.

Traditionally the sensible and the intelligible are opposed and any sensation belongs to a model: there is, on one side, the model, and, on the other side, the idea. In virtual environments, every time the image is projected on the retina, those two spheres are connected in an operative way. "From now on, *sensible images* are potentially able to modify models, the same ones that had generate them. Images and models are, in fact, of the same nature: they are two faces of the same reality, a sensible and a intelligible face"¹¹.

As Ovid suggests, Pygmalion a legendary sculptor of Cyprus, has fallen in love with a statue from his chisel and asked Aphrodite to give a woman made from that statue's image. The goddess promptly satisfied Pygmalion's wish, giving life to that statue. In this episode,

¹¹ in an interview of Phillippe Quéau, special dossier of the magazine *La Recherche*, May 1994.

Aphrodite as a transcendental potency becomes a potency that give life and provokes a metamorphosis of the figure in the reality of her model. The work is usually conceived on the image of the being, but, with Galathea, the being exists as the work's image. As a threshold phenomenon, it is the copy that originate the being on a efficient excess of the image. It is the formulation of a "vow which can not subsistute the representation of a being, even an *ideal* one, for a double's presence in the real" (Marin, 1993). It is *Pygmalion's Power*, the hyper simulacrum power, that humanity aspire since Ancient time.

Photograph achieved the perspective in real time. It was only surpassed by the *video*, because *video* allowed a real perspective in time. Technological developments in post-modernity, together with cybernetic models, are expected to bring a certain expectation on the elaboration of models close to those of Pygmalion. But, here, model and its graphical representation is not a double of the object; the goal is that the graphical representation could be seen as something that has all the characteristics of objects and could operate as stimulant field which could be accessed. Simulation is the capacity to pretend existing what doesn't exist, creating a situation of the real perception being replaced by the real of the assisted perception — Virtual Reality. "The mirror of the beings and the appearances of real and its concept no longer exists. Imaginary coextensivity doesn't exist no longer anymore: genetic miniaturisation is the dimension of the simulation. The real is produced from miniatures of cells, from matrix and from memories, from command models and, from here, it can be reproduced an indefinite number of times. It doesn't have to be rational anymore, because it can't be compared with any ideal or negative instance. It is merely operational. Indeed, it is no longer the real because it is no more entangled in an imaginary. It is a hyper-real, a synthesis' product that irradiate combinatory models in a hyper-space without atmosphere" (Baudrillard, 1981).

In these representations there is an artificial resurrection of the bodies. These bodies acquire a kind of ductile condition that through geometric combinations of lines and surfaces have the capacity to transform themselves in objects of experimentation, conditioned by the environment around them. Through protocol, the truth-record (computer) enables the realistic immersion in a synthetically and interactive world. The "visitor" immerses on the screen and inside it an unlimited and non-dimensional world appears.

The computer is a substitute of the world, which can be *neutral, extensive* (as the lens) or *intrusive* (as the Periscope). The first case deals with the translation of things as they are seen before one's eyes, for instance the virtual visits to domestic spaces. The second case intends to lengthen the reach of sight, as when one simulates certain molecular reactions, and the third case deals with the possibility of penetration in areas where one cannot physically enter, such as the interior of human arteries.

As an illusive phenomenon, virtual environments resemble a dream. Only the dream is not observable. The dream is the illusion to see what we don't see, *video* is the illusion of seeing and not having what we see. As Merleau-Ponty said, "the illusion of the illusions is to believe" (Merleau-Ponty, 1992).

Through synthetic images one can build a world of possible or non-plausible situations which can suggest various perceptions and emotions in a reserved environment: that is the

deed of *Alice*. One is transported to that world in Lewis Carroll¹² brilliant tale, *Alice's Adventures in Wonderland*. By Alice's hand, dream gives place to the perception of multiple appearances of the world or to the experiences of truth. There, likelihood is the more believable as experiences of truth are the more better. Cyberspace is the "materialisation" of Alice's deed, that is mirror's crossing.

In his *Essay on Mirrors*, Umberto Eco refers to the mirror as being a *threshold-phenomenon that settles the limits between the imaginary and the symbolic*. Any specular experience belongs to the imaginary domain, because it is an illusory phenomenon. As an illusory phenomenon it can be integrated in the symbolic system, in order to be potentially operative. It is the mirror that profiles the passage of the image to the thing (Eco, 1989).

If we look into the mirror, cybernetic device confine us in "representative and symbolic illusions that give it consistence and specular nature on its appearance" (Rodrigues, 1990). Cybernetic and specular images are real because they can be accepted as a physical and consistent object and they can be fixed on a surface (one can take their photograph). They are also virtual images because they are apprehended as if they existed inside the screen, despite the screen — a kind of Odin's record (Borges, 1975). — having only one face. That is virtual reality's paradox.

Available technical means soon propitiate proliferation of generalised simulacrum production inside reality. Cybernetic electronic devices are an example of what has been said: they enables the figure of simulacrum which with a plain and reticular form, is at the same time irradiate and impulsive. But, beyond simulacrums of the real, new models of closed significance to themselves start to emerge. They are not open to any referential sense. The computer of *War Games* does not make a distinction on the game of reality, "between total war simulation and its effective beginning, because the real and the simulacrum confound themselves on the discursive order of the programme". The figure of simulacrum provokes an "impossibility of distinction between the figure and the real and a deadly dissuasion of the representation itself" (Rodrigues, 1990).

In Escher's lithography, *Magic Mirror*, figures cross a mirror and freely emerge on a surface supposedly rigid. A real dog crosses a mirror, and while he moves away from the mirror, his specular image withdraws to the opposite side. On the other hand, when a reflected image reaches the limit of the mirror, it acquires autonomously reality contours. The real is duplicated throughout specular image and this same image gets a new real. At the end, the real and image bear a phenomenon of objective duplication of the thing.

¹² Lewis Carroll is a pseudonym of Charles Lutwidge Dogson. It's interesting the distinction between mentioned and real authority.

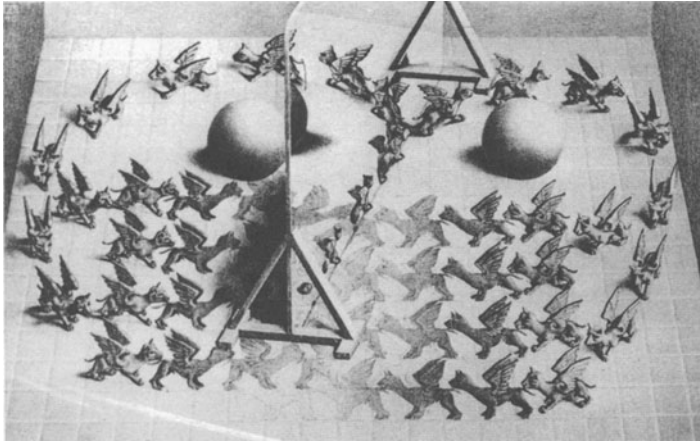


Figure 5 Magic Mirror - M. Escher (1946) (Ernst, 1991).

One of the problems that is subjacent to cybernetics and to the real is the definition of reciprocal frontiers. In the mirror world of *Alice*, this obstacle is dissolved provoking a conscious fusion between the two realities, one appearing following the other (*Alice* enters wonderland throughout a burrow). In a Virtual Environment that frontier is a physical conscious barrier, because when the user immerses in the environment, he cuts the stimulus of the outer world. Only through illusion one can reach the virtual environment. In the conscience of illusion, imagination is operative.

The objective of virtual systems is the relaxed co-operation between the visitor and the scene. The scene should be mediated by an easy handling machine less and conscious to the user. One might talk of transparency of the system which supports an illusive effect. In other words, interesting technology is the one that vanishes itself. Therefore, the more invisible technologies are and the more they embody themselves in the processes and in navigation practices, a better resolution one can take from illusive suggestion. When an artist draws, we doesn't feel his hand or the drawing object, the spirit must be directly attached to the drawing surface. Such must be the sensation of a user of any system: he doesn't have to feel the machine or the technology. That technology must be a passport that cancels the frontier.

An interesting point is the way one proceeds towards the knowledge of the object trough an interacting relationship between subject and object. The subject can act on the object and formulates, by this way, his own knowledge or, possessing already a certain knowledge of the object, it is the object itself that acts on the subject, causing a new knowledge of the object. It is why this relationship is interactive. In Cyberspace knowledge is provisional. It can be, however mould in the relationship of virtual subject/object — and vice versa — and adjusted in the relationship of real subject/object.

Related to this fact is also the question of knowing and of recognition. Or the thing is recognisable and in virtual system one needs external experience of the subject to validate action/reaction with the object, or it will be the thing itself that later will validate the interior experience one had on the virtual environment. As pure experience, virtual system only validates the virtually of the “experience” itself. Nowadays, sometimes is the simulacrum itself that validates the thing; it is familiar the usage of the expression “it almost looked like a movie” to narrate a situation and to make it true. Other times this expression appears in the movie itself and has the objective of transporting ourselves into reality.

Virtual Environments are like means of transport: they withdraws us from the environments where we physically are and takes us to other “spaces”. Virtual Reality as a *medium*, symbolically allows to accede to physical object, despite it dispenses it. In real, the bodies are substituted by an illusory but operative artifice, functioning as a dissuasion process of that real: image becomes real and the real is imaginary. Through the suppression of truth, the systems of virtual reality create an illusion of supplementary truth by attesting what is credible. The virtual is an intervention work which seeks in reality the control over perception, replacing world’s materiality by the dematerialization of “our reality”. In cybernetic devices, apparently permeable, one operates with immaterial material and one moves in a non-dimensional space. This is a form of absent presence.

Virtual environments confine themselves a world to which one cannot demand more than to what the system has on its programme. In other words, this discovery will be always “controlled”. Virtual environment are made with a key to experiment things. These environment presupposes always the total immersion of the subject by voluntary contract and always denounceable. All interactions between subject and the machine must be simulations in real time. It is through emotion and not through reactive interactivity that one are transported into spaces.

In this symbiosis man/machine/virtual environment a double presential genesis is established: physical presence on the real and virtual presence in Cyberspace. This is the gift of ubiquity.

If with the sentence *Johanes de eych fuit hic* written under the wall mirror of the nuptial camera which reflects the visible and invisible space (situated beyond the painting which canvas is “transparent mirror” and the painter stands still) the author of *Giovanni Arnolfi and his Wife*, signalises the ubiquity of the producer subject and of the represented subject (?) — eye and witness. In *Las Meninas* of Velásquez such an artifice is suppressed when the artist contemplates the model and he focuses his look on an external point outside the scene, coinciding with the eye of the spectator. There is, objectively, an inversion of roles: the spectator is the painter’s model and the model on the linen is the audience represented on the scene. The artist is portrayed on the painting and the canvas made by the painter is not seen. In the moment that the painter places the spectator in his sight, he projects his image on the canvas is has turned is over and which has a visible reverse. But, surreptitiously, in the painter’s *atelier* back window, among a series of suspended pictures, a mirror is found which offers the real image of the canvas, the one canvas marginalizes; the mirror gives back the invisibility of the painting (Foucault, 1966).



Figure 6 Giovanni Arnolfini and his Wife - Jan van Eyck (1434) (Gombrich, 1989).

The two examples we present (Figures 6 and 7) attest the problem of ubiquity in what concerns psychological and representative issues. They are, therefore worthy witnesses of the artist’s skills. They also point out another important question: the symbolism of self-representation and the abolition of the frontier that the painting constitutes between the world represented and the physical world.

Ubiquity is subjacent to virtual world. Cyberspace is an ubiquitous world of physical and mental immersion on image, where we can sail through virtual universes created by communication. But the most surprising thing is that one can choose between look at virtual world through his own eyes or with somebody else’s in extra-corporeal experiences — *impartiality principle* — and one can, without any mirror, re-examine oneself. Through stereoscopic laser helmets capable of stimulating the retina, one creates a sensation of

immersion and navigation on a controlled environment, capable of interacting and handling images.



Figure 7 Las Meninas - Velázquez (1656) (Gombrich, 1989).

The effort of seeing is no longer needed, the image meets the eye and settles down on the inside of the retina. Mutual attraction between the eye anxious to see and the object anxious to be seen, always mediated by the image, becomes a state, as Paul Virilio would say, of *Polar Inertia* where active image dispenses the object of which it is referential and gives attention to a passive observant. Traditionally it is the look that reveals the identity of the figure, in Cyberspace it is the image that reveals itself over the look. The image of synthesis assumes itself as an objectual latent potency.

As Paul Valery wrote:

“The desire of *realism* search more and more for the powerful means of reproduction. Reproduction leads to technique. Technique leads to classification and order. Order leads to the systematic, to the complete exploration of the most generous employment of all the resources, to his largest freedom, above anything else to fulfil. And taking exact reproduction

of a concrete fact as a basis one will reach a kind of gymnastic which includes *false* and *true*."(Valery, 1994)

It is this duplicity that the painter René Magritte caricatures:

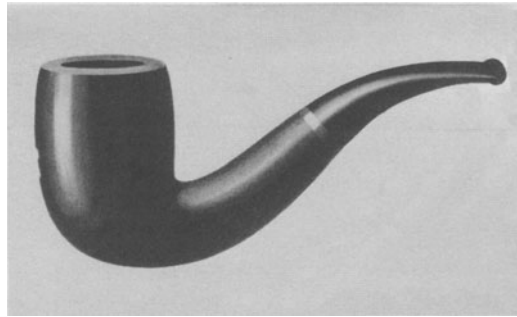


Figure 8 Ceci n'est pas une pipe - Magritte (1928/1929).

REFERENCES

- Battisti, E. (1990) *Giotto*. Editions Albert Skira, Genève.
- Baudrillard, J. (1981) *Simulacres et Simulation*. Éditions Galilée, France.
- Bergson, H. (1911) *L'Évolution Créatrice*. PUF, Paris.
- Borges, J.L. (1975) *El Libro de Arena*. Emecê Editores, Buenos Aires.
- Eco, U. (1989) *Sugli Specchi e Altri Saggi*. Portuguese version of Difel, Lisbon.
- Ernst, B. (1991) *Espelho Mágico de M.C. Escher*. Benedikt Taschen Verlag, Berlin.
- Feuerbach, L. (1992) *L'Essence du Christianisme*. Editions Gallimard, France.
- Foucault, M. (1966) *Les Mots et les Choses*. Editions Gallimard, France.
- Frade, Pedro Miguel (1992) *Figuras de Espanto*. Edições ASA, Porto.
- Gombrich, E.H. (1989) *The story of the art*. Phaidon Press Limited, England.
- Hollanda, F. (1549) *Do Tirar Polo Natural*. Livros Horizonte, Lisboa.
- Manzini, E. (1993) .Mutamenti Percettivi. *Lotus* , 75, Milan.
- Marin, L. (1993) *Des Pouvoirs de l'Image, Gloses*. Seuil, Paris.
- Merleau-Ponty, M. (1964) *Le Visible et l'Invisible*. Editions Gallimard, France.
- Modica, M. (1992) *Imitation*, vol. 25 of Einaudi Encyclopedia, port. version by INCM.
- Murtinho, V. (1993) *Perspectivas: O Espelho Maior ou o Espaço do Espanto*. FCTUC, Coimbra.
- Panofsky, E. (1927) *Die Perpektive als "symbolische form"*. Vortrage der Blibliothek Warburg, Leipzig-Berlin.

- Pessoa, F. (1986) *O Livro do Desassossego*, from the heteronymous Bernardo Soares, Publicações Europa-América, Portugal.
- Rodrigues, A.T. (1990) *Estratégias da Comunicação*. Editorial Presença, Lisbon.
- Seneca, L.A. (1991) *Ad Lucilium Epistulae Morales*. Portuguese version, Fundação Calouste Gulbenkian.
- Sontag, S. (1986) *On photography*. Translation of José Afonso Furtado, Publicações Dom Quixote, Lisboa.
- Tavares, D. (1994) *História da Arquitectura*. FAUP, Porto.
- Valery, P. (1994) *Tel Quel I. Choses tues. Moralités. Les Principes d'architectie pure et appliqués*. Editions Gallimard, France.
- da Vinci, L. (1943) *Trattato della Pittura*. Castilian version by Mario Pittalluga, Losada Editorial, Buenos Aires.
- Virilio, P. (1990) *L'Inertie Polaire*. Christian Bourgois Éditeur, France.
- Wright, L. (1983) *Perspective in Perspective*. Routledge & Kegan Paul, London.

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