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# Art as a Generator of New Mental Patterns: From an epistemological perspective of Modern Physics, Neuroscience and the Buddhist system of thought.

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MPHIL

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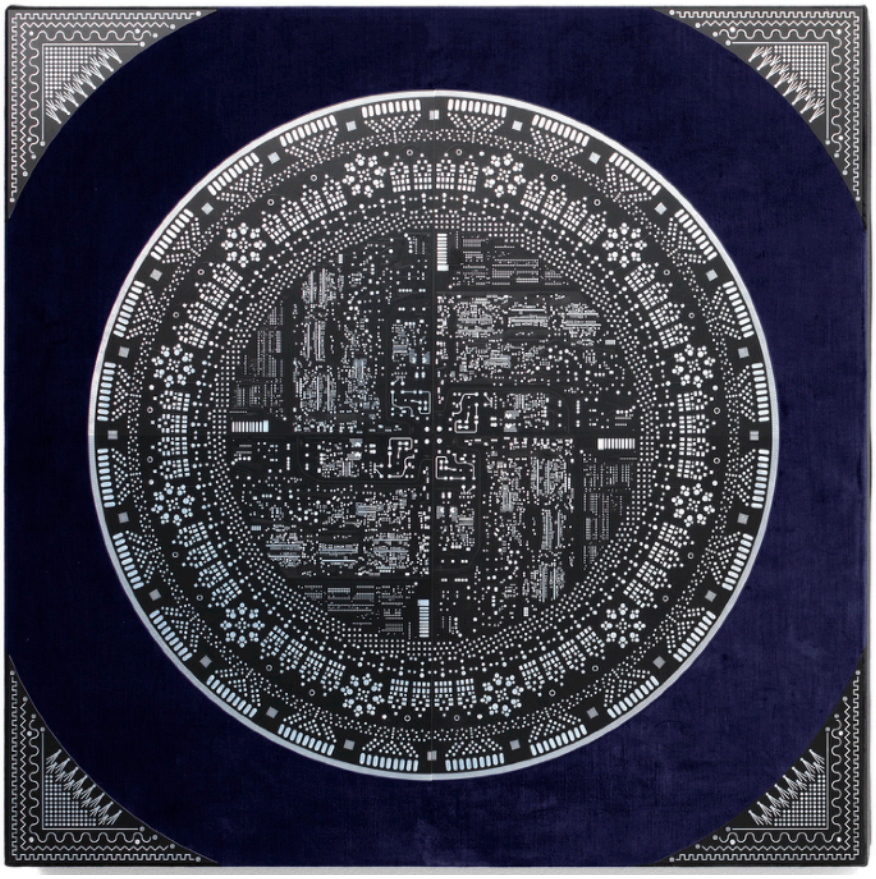

**Sarah Ciracì, *Elettronica-mente* (2008), Printed circuit board: vetronite, copper, varnish, velvet, 100x100 cm**

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**Abstract**

This thesis draws upon research in Eastern philosophy and neuroscience to argue that art is capable of metabolizing and embodying different levels of reality, and therefore functions as an instrument that can generate states of consciousness. The research and writing that went into this text has provided the critical and conceptual foundation for a new artwork, which I present in the last chapter.

Historically, art changes in tandem with the paradigm shifts of a given era. This thesis argues that our contemporary paradigm shift has introduced new ways of considering the relationship between subjectivity and objectivity. Such categories no longer conform to a Cartesian paradigm, which insists on considering them separately, and instead more closely resembles the context of quantum physics, which establishes an entanglement of subjectivity and objectivity.

Neuroscientists and philosophers of mind contend that consciousness is a special information process in which new knowledge is generated. My thesis conflates consciousness and creativity, arguing that contemporary art is a privileged field in which this human ability is concretely developed, and in doing so, preserves individuals and society at-large from the danger of repetitive and automatic thought. (McLuhan, 1968). To outline this argument, I draw upon notions like Damasio's "neural patterns", Chalmer's "information spaces" and the "ego tunnel model" defined by Metzinger.

Attempting to interpret the interdependence between subject and object, it can be taken out the existence of a gap between complex, abstract scientific discoveries and their ability to be metabolized on individual level, a gap that

Francisco Varela attempts to resolve through his invocation of the need for an embodied knowledge, which he explores by bridging studies in cognitive science and Buddhist mindfulness practices. The present research adopts the position that an analogous process of embodied knowledge exists in the artistic field, thanks to art's ability to reconnect observations of how the outer world is experienced on a subjective level, creating a circularity—a bond—between subject and object, between art work and viewer, which is never fixed but always mutually changing and evolving.

Keywords: objectivity- subjectivity- fragmentation - wholeness-consciousness-pattern-creativity-enaction

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## Overview of Art Works

As a working artist, not a single day has passed without wondering about the meaning and the function of my art works. After almost two decades of activity, I have finally decided to address the question directly and extensively, starting from a broader and deeper conceptual basis. This is the main purpose of the present thesis: not only to present a theoretical survey that provides a conceptual framework for my art projects and video installations, but also to highlight the answers that can be given to questions about the function of contemporary art as it relates to developments in modern epistemology and the evolving nexus between mind, art and technology more generally.

It has always been clear to me that my contribution to artistic research is to express and understand what happens in the here and now. My personal biography is reflected in my art through my childhood fascination with the growing presence of technology, such as the cathode-ray tube and the appearance of commercial TV in early 1980s, which I could contrast with the stories spun by my parents, who had grown up in the mostly rural world of the Italian Mezzogiorno largely devoid of such marvels. The pervasive presence of technology undoubtedly opened a generational gap between us. Their childhood hadn't included endless afternoons spent front of the TV screen watching news and cartoons, crime fiction and science fiction. At first, dealing with contemporary art meant also dealing with the visual culture created by the uninterrupted flow of televised images projected into the minds of children in every household. I didn't own a computer yet back then, and I had yet to experience the grand revolution brought about by the World Wide Web. To me, technology basically meant television. The feeling was twofold: the flow of information represented both a treasure and a limit.

How could I transform that enormous flow of pixels that flooded the corners of my mind into a creative process? It was then I started thinking about the issue of reality. Did reality and television correspond to one another? Most certainly, they did not. I intuitively understood that media function as generators of fears and desires. The visual broadcasting medium induces given states of perception and projections of reality with specific aims, in the service of dominant consumer society and the policies compatible with transnational business and finance. At the same time, television acts as a mirror, a multiplier of images. The more TV reflects, the more it makes us lose sight of what the original image was. Therefore, I too could use technology in order to build a subjective reality that had the power to express alternative, personal views of reality. I thought about the fact that truth increasingly corresponds to an act of faith, more than to an objective concept. Reality and truth are never unique, never objective, this has always been my working assumption.

We accept the version of the facts that best adheres to our values about what is true and what isn't. But technology, with its increasing visual sophistication, can make us believe anything, even the unthinkable. Perhaps it's naïve, but thinking about how the world has been turned upside down twice in a little more a century by the electrical and electronic waves of technological revolution—especially if one considers about how slowly technology had progressed in the long preceding centuries—is something that still bewilders me. I chose to begin my work from this impulse. The simple observation that technology alters our perception of reality has prompted my research and, over the years, I have tried to utilize technology in my artistic projects to speak about the unspoken powers of technology—to better metabolize them, while unveiling its magic but also the threat of reducing the world to hallucinatory perception. I intend to activate a process that metabolizes technology through the creation of an art work, something that corresponds to Francisco Varela's urgency regarding creating an

embodied form of knowledge. Most of my art is in fact aimed at reconnecting the virtual or media world, with real life, the real world and our mediated experience of it, due the continuous manipulation and subjectivation of reality imposed by broadcast media and social networks. What I articulate is resistance to a pattern of reality subjected to consumer needs and capitalist objectives. In my view, contemporary art is a way to process and explore subjective impressions, but returning them in the form of objects that are full of meaning for both the artist and the viewer. According to the present thesis, the creative process is also capable of generating new patterns through which a constantly evolving reality can be perceived, therefore enabling aesthetic consciousness and social awareness to arise. I thus propose that contemporary art is a privileged means to process states of consciousness in a way that is capable of modifying common sense and received wisdom. In doing so, I argue that in Western culture art has a function similar to Eastern meditation, insofar as they share the function of creating new lenses and new patterns to see, generate and appraise reality.

By addressing questions regarding the nature of mediated reality, as well as cultural syncretism, I explore what the science fiction imagination has to say about the nature of objective reality and the subjective point of view, which has been hopelessly entangled since the worldview proposed by quantum physics found experimental confirmation. If it is the observer that determines either the position or velocity of a particle, one could well wonder what would happen to the uncertainty principle if the observer was an extra-terrestrial and its point of view an alien one.

In my first artwork, completed in 1995, I portrayed myself performing the three phases of a fake UFO sighting.

Sarah Ciracì, *I Wasn't Particularly Astonished to See Them on the Horizon, but I Would've Never Imagined They Would Land and Talk to Me About Their Planet* (1995), 3 Iris prints 34x26 cm.

Recent evolution in digital technology had made the work possible. In fact, the first widely available version of Photoshop was released in 1990. With the spread of Photoshop, nothing would ever be the same. The unprecedented ability to manipulate images with software dealt a mortal blow to the notion of photography as an instrument that documented reality. And yet it is precisely tools like Photoshop that enable the emergence of our complex and stratified contemporary reality, a reality inevitably made up of fictive representations and self-representations. It is no longer simply the photographer's point of view ("I am a camera") that provides us with partial and subjective realities. Doubt becomes a default mode to survive in the world of pervasive media in which one can manipulate images to make subjects appear not as they are but as you want them to be. My first work contains the seeds of my subsequent artistic research, namely the desire to experiment with new technologies in contemporary art, the idea that any representation of reality mirrors an interior vision that best expresses one's belief and her/his willingness to believe. Our love for digital technology broadens our senses and frees us from the limits imposed on the human senses, thus making the fake and the uncanny necessary elements to deconstruct and reconstruct reality: the grand metaphor of extra-terrestrials is for me a mental exercise to consider non-human perspectives that can lead to expanded perspectives on the mind, reality and technology. It is not a matter of whether or not one should believe in aliens, but rather the ability

to aesthetically deal with something radically novel that has the capacity to overturn our conceptions of the universe and the metaphors that we develop to speak about the cosmos and our place within it. There are no precise dates for the earliest reports of UFO sightings, but they undoubtedly became widespread in the wake of the startling acceleration in technological development that took place at the end of WWII with the invention of the atomic bomb and the digital computer. The image of the extra-terrestrial forces a sort of retrospective vision of history, the appearance of a *uchronia* that arises from the confirmation of the existence of intelligent life outside Earth.

If we want to interpret the phenomena of UFO sightings from the point of view of the collective mind, it is symptomatic of an extremely deep, epochal change in the overarching role of technology and its destructive power, one that could annihilate the human species in the space of few days. This could not escape the notice of the greatest investigator of the collective unconscious, Carl Gustav Jung, who in 1958 wrote a short essay on the subject: *"Flying Saucers: A Modern Myth of Things Seen in the Skies"*. Jung viewed the unconscious of his times as something lacerated, fragmented by political, social, philosophical and technological forces of extraordinary scale beyond the human grasp. Jung considered the UFO the quintessentially modern archetype that hid the fear of the bomb, of another global war that would lead to total annihilation. UFOs symbolize the fact that the marvels of science and technology have turned into the horrors of war and destruction. Flying saucers represent visions of fantastical objects that make the repressed elements of the collective unconscious come to the fore of popular culture, such as in the 1940s and 1950s, the so-called atomic age, and again in the 1980s and 1990s, the so-called information age. A circular spaceship hints at the possibility of reconciling human and non-human experience in the universe, since the circle is an archetypal symbol that lies at the base of every human culture, where it invariably represents

unity and integration, wholeness and cyclicality. Among various hypotheses regarding the existence of UFOs, Jung concludes that they arise out of our belief in a powerful archetype: destruction by alien forces. Modern culture has largely dispensed with religious icons and sacred images of devotion such as crucified Jesuses and transfigured Madonnas, as these no longer induce mystical visions and provoke raptures in a largely secularized West. Instead, it's the UFO and other similar sci-fi tropes that best symbolize the fears and desires of a technological era, and also express our lingering yearning for the religious and the transcendent in the space age, rendered as the mystery of the universe's origin and human evolution in a movie like Stanley Kubrick's *2001: A Space Odyssey*, or as pop fantasy mysticism in the *Star Wars* saga. "Space archaeology" is a pseudo-scientific way of reinterpreting our past, starting with unresolved archaeological evidence, as proof that extraterrestrials were present on our planet even in the distant past. Here, once again, the interesting thing is that the image of the alien offers us a new vision of past civilizations and of the human future. The UFO is a canvas onto which the crushing sentiment that there remains a vast universe out there to be explored can be projected. If we assume there are non-terrestrial entities out there that observe us, we are led to consider ourselves as a single, global entity, thus leaving behind fragmented visions of humankind based on the differences between races, cultures and territorial boundaries. Earth must truly become a global sphere, in order to defend and protect itself from potential alien attack.

Sarah Ciracì, *Not Even Background Noises*, (Stone Desert) (1995), Iris print, 22x39,5 cm.

An example of how an alien perspective reconstructs reality is the above work, also dating from 1995. By using Photoshop, I eliminated all points of reference from an agricultural landscape close to home, thus making the area a place of ambiguous existence, devoid of all direction, an alien place like the surface of a rocky lifeless planet like Mars. It was almost as if I desired, symbolically, to make a clean sweep of everything that had guided my mental landscapes until that moment. I removed information, certainties, by building vast, deserted, either pre-human or post-human territories where I could construct a new reality.

One's own life experiences can sometimes be a load to bear. They can anchor a person's mind in mental pathways that are hard to walk out of. Mine was a rite of initiation that would lead me into places I had yet to explore, by making a *tabula rasa* of my usual time-space coordinates. And as is often the case, the more you want to free yourself of something, the more the removed element rises forcefully to the fore. This is the case with *Question of Time* (1996), where aliens expectedly come from the ground, by

breaking through the planetary crust with two huge drills, something that also overturns ordinary perception, as if the Earth was in fact the aliens' underground terrain, and human settlements were akin to oil deposits to be drilled until exhaustion. I knew where the image of the drills cam from: from Japanese *anime*, the animated cartoons featuring mega-robots

Sarah Ciracì, *Question of Time* (1996), Metal drills and wood, dimensions variable.

and galactic conflicts that were very popular in Italy during my childhood. I saw loads of them when I was a little girl. I remained glued to the screen for hours and hours on end to watch *Goldrake*, *Jeeg*, *Mazinga*, *Gundam*, *Daitan.* I remember my mother had to beg with me to turn off the television and go outside and play with the other children. It was perhaps beginning with this artwork that I no longer passively conserved images accumulated from when I was a little girl, and my creative process got under way. They were like residues, elements that had remained fixed in some corner of my mind, and which now demanded to be revisited and revised. A decade ago I watched *Goldrake* cartoon again together with my five year-old son. I found the experience deeply disturbing. Every single frame of those cartoons contains an apocalyptic depiction of violence, itself a by-product of Hiroshima and Nagasaki, which is truly difficult for a child to digest. It is an extremely powerful idea of total destruction.

My son immediately recoiled by saying “This stuff is too violent for me”, although he learned the theme song by heart. I, on the other hand, watched the whole show with my mouth agape, unable to bring myself to pull my eyes away from the screen. Cartoons pose a truly fundamental problem. Do they really have the power to exorcise evil characteristics latent in every human being, or are they themselves an agent that shapes minds, inducing them to accept violence and strife as values inherent to humankind?

In a post-apocalyptic vein, I also created desert landscapes in which artificial and natural elements coexist in a single aesthetic dimension. These art works were influenced by J.G. Ballard novel *The Atrocity Exhibition (1970),* in which enormous shopping malls, vast parking lots and endless highways are described as protagonists of a new, postmodern landscape: a blend of natural and artificial, of metal and flesh, of spontaneous outgrowth

and human calculation. The title refers to a reality where all white and black noise is filtered out from perception—a kind of extra-terrestrial gaze.

Sarah Ciracì, *Not Even Background Noises* (Concrete Desert) (1996), Digital print, 100x120 cm.

After this vision of deserts waiting to be filled, I began to develop a more articulated poetics. I then conceived a carefully considered, long-term project featuring Marcel Duchamp as its protagonist that articulated itself in many different versions. In some ways, Duchamp is an alien figure in modern art. His artistic investigation was so disruptive that it truly placed him in another dimension when compared to previous, contemporary and even subsequent artistic production. The work of this extraordinary artist has anticipated practically every aspect of contemporary art. He touched all mediums, from cinema to painting, performance, photography and cybernetics. He initiated *ex nihilo* ready-made and conceptual art. The spark that fuelled the idea of this project came when I connected crop circles—

enormous drawings on fields of grain that are often attributed to other worldly visits—to the photographs that Man Ray took of what I consider Duchamp's ultimate masterpiece: *The Large Glass*. Duchamp spent seventeen years completing this enigmatic work of art. It is composed of two sheets of glass that enclose wire elements. Duchamp abandoned the artwork for several years, leaving it lying on the ground where it gathered a great deal of dust. The artist liked the idea that he was creating a dust farm. Then Man Ray then took photographs of this dusty landscape.

The above-mentioned project led to the creation of two videos. In the first, Duchamp is in the middle of a vast field, as he glances at an alien spaceship leaving strange marks on the ground, which is the very image that Man Ray captured in his photograph of *The Large Glass*. Extraterrestrials leave an alien message impressed in the landscape, one that the artist will need in order to realize his masterpiece.

Sarah Ciracì, *Question of Time* (1996), Metal drills and wood, dimensions variable.

I insisted on interpreting the notes Duchamp himself left on his artwork in order to look for traces of alien messages. I read these notes with a magnifying glass, enabling me to reveal information previously hidden from view by our customary viewing habits. I was looking for an alien subtext. Imagine how happy I felt when I read the way in which Duchamp had conceived the title of his masterpiece: the artist used homophonic double interpretation to entitle his artwork. In other words, he used a sentence that when pronounced can have two different meanings.

Sarah Ciracì, *Celestial Threshers (The Bride Eats the Soul of her Bachelors, Even)* (2005), video projection on opal glass, audio, 270 x 170 cm

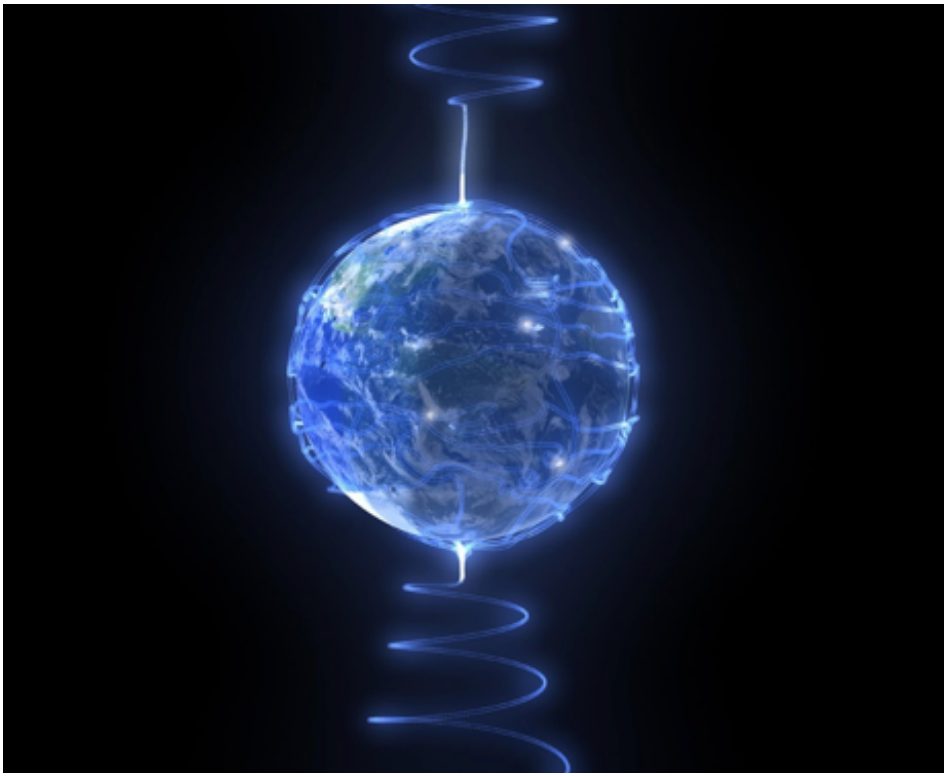
The original French title, *"LA Mariée Mise à Nu Par Ses Célibataires, Même"* [*The bride stripped bare by her bachelors, even*], contains a second homophonic meaning, namely *"LA Marie est Mise à Nue Per ses Célibatteurs." [Mary is laid bare by her celestial threshers*]. Those threshers in the sky were the alien reference I was interested in. Thus, I gave the title of "*trebbiatori celesti*" (Celestial Threshers) to the work pictured above. In my view, Duchamp was referring to extra-terrestrial threshers who had left strange traces impressed in that abandoned field, which in our day are referred to as crop circles. Although there are people who want to read an esoteric allusion to the cult of agriculture into this reference, to my eyes the content was different.

And the discoveries did not end there. In his notes, Duchamp spoke of "handler-trainers of gravity," "controls arbor type" and "oculist witnesses." These are all elements that often recur on websites and blogs devoted to UFO sightings. Inspired by this new interpretation of Duchamp's work, I created an animation of the Large Glass, projecting a new and personal interpretation onto it. I think my attempt is germane to Duchamp's drive, as it is motivated by the desire to open up to additional analytical levels, to add a layer of interpretation that goes beyond the one ingrained in traditional artistic investigation. The animation narrates, in an equally mysterious form, how the bride cultivates humans here on earth in order to process their energy through various passages from one material state to another, in order to draw nourishment from humankind. These aliens (or space gods) feed on our soul. One characteristic of my artistic production is the desire to place content coming from pop culture (the alien invasion theme) on the same plane as content coming from high culture (Duchamp's art). In my poetic universe there are no hierarchies between high culture, academia and pop culture, the latter spread first and foremost through websites and social networks. In fact, popular culture on the Internet has become crucial to

anticipate and interpret the grand themes of our era, no matter its (often tenuous) relationship to truth and reality.

In 2012, I created a fake based on these convictions. The original artwork was created in 2004, and was conceived by using UFO documentaries focusing on people who were “contacted” or “abducted”. The events that take place in 2012 are being narrated from the vantage point of a later date. In a certain sense, it is not a fake documentary, as it cites the theories and ideas that have actually been circulated on various websites. Drawing from Mayan eschatology, 2012 was thought to be the harbinger of apocalypse or at least a major turning point for the future of the human race. The date is drawn from the Mayan calendar, since its cyclical system drew to a close in 2012. According to online conspiracy theorists, 2012 would have brought official recognition of the existence of aliens. I took these curious theories and added information gathered from other, more reliable sources. For example, at one point in the documentary the person being interviewed describes what happened to him one night when he fainted at the sight of a luminous sphere that appeared in the woods. He claims he cannot remember anything from that moment forward until, many hours later, he woke up and found himself in a different place. This episode was recounted by Kary Mullis, Nobel Prize for Chemistry in 1993, in his book *Dancing Naked in the Mind Field* (2000). He claims that during those hours of unconsciousness he was kidnapped by aliens. The theory of synchronic lines is instead portrayed in the following video. Such energy flows are laid out in a grid pattern across our planet, and connect us with the rest of the universe. Our ancient ancestors were familiar with this grid of flows, and built sacred structures near them. In recent times, in Italy’s Piedmont region a new community was founded at the point where several of these lines converge. This community, known as the Federation of Damanhur, has roughly 1,000 members. They erected a temple to celebrate their belief that humans can benefit from the energy flows of geomancy and thereby come in contact

with superior spheres of reality that can provide superior knowledge and enlightenment. The lines work as a sort of natural network, through which it is possible to send and receive information between beings that are located in line with the same flows across space. The Oriental version of this view of the universe is Feng Shui, the Chinese worldview, according to which it is important to organize a living space in harmony with cosmic



Sarah Ciracì, *2012* (2004), Video still, Duration 14 minutes.

flows. Ufologists believe that galactic pathways allow extraterrestrials to conduct interstellar voyages that are not bound by traditional space-time constraints. String theory provides similar ideas. For instance, the Einstein-Rosen wormhole is interpreted as a shortcut to go from one point in the universe to another, one that would make it possible to travel through the universe at a velocity faster than the speed of light. This is an excellent way to open one's mind to what the new frontiers of science are revealing: the

discovery of new dimensions will overturn human perception and our established notion of reality. Thus, I created an iconographic account framed by an investigation into contemporary architecture so as to present a taxonomy of built structures from all over the world that share the characteristic of being aesthetically connected with futuristic and sci-fi-inspired imaginaries. These architectures reprise aerodynamic and streamlined shapes in an attempt to liberate art buildings from the forces of gravity. I turned some of the world's major museums into spaceships that can save the human race from the uchronic catastrophe of 2012. It is an updated version of the myth of Noah's Ark. Daring architectures become the vessels for the salvation of humankind.

Sarah Ciracì, *2012 (2004),* Video still, Duration 14 minutes.

In 2008, I was chosen for a three-month artist residence program in the town of Aomori, Japan, at the ACAC Museum designed by Tadao Ando. There I became familiar with Japan's magnificent culture, and explored how Japanese culture expressed itself in the portrayal of humanoids on pages and screens. When I saw the robot ASIMO at the Miraikan, the National Museum for Emerging Science an Innovation, I was truly stunned that a

Sarah *Humanoid Portrait (iCUB) (2008),* Light jet print, 150x110 cm.

robot could provoke such powerful emotions. When the show was over and the robot moved backed into the case that houses it, without so much as blinking an electronic eye, the small observation window closing shut, I couldn't help but feel compassion for that somewhat intelligent being. I stared at the robot for several minutes, waiting for a gesture of rebellion, some vital sign of freedom, to no avail. Technology really creates affection. We have come a long way from the time when we viewed robots as anti-human, a debased version of mankind, fearing that technology might rob us of our emotions. Today robots seem more humane than humans. They are increasingly being built to keep humans company and show them empathy.

We look at ourselves reflected in technology, searching for some trace of our human nature. Nowadays, technological know-how and human knowledge travel along the same path. The more we learn about the way our brain works, the more its functions are reproduced in technology and vice versa. These humanoid robots thus possess their own individual skills, their own personalities and their own stories. Once I had returned to Italy, I went to Genoa to visit the Italian Institute of Technology (IIT), so that I could make the first artistic portrait of Italy's first humanoid robot, iCub. The android iCub was designed to imitate human development. During the early stages of its life, iCub crawled around on the floor. Now that iCub is several years old, he can play ball games and is learning to use its hands. I wanted to insert iCub into a visual framework borrowed from tradition of classical portraits. In the work *Humanoid Portrait (iCUB)*, pictured above, the iCub is portrayed in the company of a domestic animal, a dog, in order to replicate the way painters from earlier eras portrayed wealthy children in the company of pets and other animals. What I wanted to achieve was a contemporary portrait of a robot with human dignity.

Technology, i.e. the application of new scientific discoveries to new devices and processes, has taken me on a path that has grown increasingly more intriguing as I come closer to the edge of science in the twenty-first century.

The new frontiers of science strike me as truly fertile terrains, places rich of potential for adventure and experimentation. Today, science deals directly with mystery, constructing fascinating theories that launch us into worlds and dimensions that had hitherto belonged to the sphere of science fiction alone. Quantum physics provides us with an image of reality that is mystically immaterial, and where consciousness plays a key role in order to arrive at any conceptual formulation of the physical world. By delving, as far as my humanistic training would allow me, into new physics scenarios, I became aware of how common sense and scientific evidence do travel at different speeds, and this is perhaps one of the most revealing cultural gaps of contemporary times. Limits that reside entirely in our very structure of thought are capable of putting limits to sensorial perception, thus preventing us from fully appreciating how all natural phenomena are interconnected, albeit to varying degrees and levels.

The last work of art I completed before starting this thesis, (cover image) was a mandala created by using electronic circuits on motherboards. I wanted to trigger an osmotic process between the Buddhist practice of creating mandalas for decoration and introspection, and the ingenious engineering behind the printed circuits of Information Technology. This project brings together the true circuitry of our everyday existence: TV parts, cell phone circuit boards, video game components, etc. I wanted to portray the structural essence of its. Tibetan mandalas tell stories, and mine is the story of technology viewed from the inside, from the vantage point of glorified chips and semiconductors. Contemplating mandalas activates areas of the brain that make our minds labour and strive toward a sense of unity, so that it can recompose fragmented experiences and images. Mandalas trigger circuits of brain activity, which provides the energy to recall memories that can influence our state of mind. The cover image of the present thesis is in fact a work of art, because it condenses and summarizes

the topics that lie at the heart of my research: art, science and transcendence. I create with the aim of overcoming the duality between subjectivity and objectivity, art and technology, science and religion. To do so, I explore a range of artistic approaches and mediums that seek to re-integrate what in Western culture has been kept separate for too long.

## Overview of the Structure of the Thesis

The first chapter outlines a paradigm shift that has occurred at the turn of the twentieth century, the results and full potential of which have not yet been fully actualized. Epistemologists of science such as Thomas Kuhn (1962) and Paul Feyerabend (1975) are taken into account, who demonstrate that a paradigm shift imbues every aspect of reality, without following a precise method or a linear logic. The idea that creativity plays an important role in the advancement of knowledge is introduced, as well as the notion that every change occurs simultaneously. I trace a path in which the observer is included in scientific observation, producing a shift in the importance of the subject, a displacement that coincides with the collapse of absolute and independent values long promulgated by Descartes. Newton's determinism is followed by Heisenberg's indeterminism in the field of science, in which subjectivity gains a stronger position. The philosophical gap left by Descartes's objectivity coincides with the spread of eastern values in Western thought, which introduces anti-materialistic and anti-mechanistic views.

Within the context of art, alongside the affirmation of abstract values, the role of the viewer undergoes a transformation from being a passive receiver to an active subject who co-creates the meaning of an artwork. This shift is indebted to the work of Marcel Duchamp (1917) and his invention of the readymade. After introducing the three areas of interest of the present thesis —namely science, eastern thought and art—I briefly highlight how the fracture between subject and object begins to be resolved before pursuing an in-depth analysis of how these changes occurred and the new conceptual categories that have emerged.

The second chapter is dedicated to the scientific context, highlighting how science's role in bringing us to objective truth through rationality is still accepted as common sense. Thomas Kuhn (1962) instead argues that the scientist, during a scientific revolution, is often moved by faith at the first stage of his research. David Bohm (1996) affirms that science deals with models of reality rather than with reality in itself and insists that analysing reality as composed by independent parts no longer works, affirming that the universe functions as an undivided whole. Paul Feyerabend (1975) argues that scientific research is often driven by subjective and irrational values, as scientists themselves are often also motivated by political and economic interests. The second part of the chapter analyses the observer, who enters the scientific process not only from an epistemological point of view but also concretely during the experimental phase. Einstein (1905/1916) forces us to accept that there are values such as space, time and mass (E=mc2) that are not independent from each other. Heisenberg (1927) subsequently affirmed that it is impossible to simultaneously measure the position and speed of an electron because these two values are complementary. The limits in measurement in Bohr's view are not purely instrumental, but rather imply a new concept that understands reality as a phenomenon that incorporates the subject and the object into a whole, as opposed to measuring apparatuses that mark the distinction between subject and object. There are two significant experiments in quantum physics that are able to affirm that the relationship between elements is an inescapable reality. The double slit experiment, in which light reveals a double nature of waves and particles, depending on the way the observer chooses to observe the phenomena, and the *entanglement* experiment, in which two particles that share the same quantum state for a certain time are still dependent on one another once divided in space. Consciousness does not only become the

object of scientific studies, but is also an essential component in the ontology of reality.

Following the path in which subjective values gained a new importance within the scientific context means, in the present research, reconsidering the role of art. Perhaps the most subjective of all knowledge, the sphere of art is a space in which becomes possible to change the world in a deep and subtle way through altering our perception of it. In this context, marked by the collapse of objective values, a renewed interest in relations ensue—in the circularity between the world and mind, between subject and object, between matter and consciousness. The importance of the conscious observer (the scientist) in defining phenomena at the quantum level, with the consequence of the lack of solid philosophical foundations to support such a conception of reality, opens the way to dialogue with the East, in which the empirical inquiry of reality has never been separate from the subjective perspective. As discussed in the third chapter, comparison and exchange between scientists and the Buddhist tradition has proven to be a very fertile field. It was Francisco Varela, together with the Dalai Lama, who in 1987 institutionalized an open dialogue between science and Buddhism in biennial meeting called Mind and Life. They shared the aim of filling epistemological blanks. For the Western perspective this meant attempting to reconcile mind and body, theory and experience, subjective knowledge and objective knowledge—things that had been kept separate for all too long. Buddhists, on the other hand, needed to integrate certain aspects of their knowledge, which were considered too rudimentary when compared to sophisticated contemporary scientific demonstrations. Emptiness, impermanence and dependent origination, are Buddhist categories of thought which imply that reality is just about relationships, that nothing would exist without any degree of connection and exchange between elements, values that are particularly urgent to deepen in Western culture. Varela, Thompson and

Rosch (1993) utilize the term *enaction* to express a circularity between mind and world and to entail a critique of the idea that mind is just a pure reflection of reality. The psychoanalyst Massimo Ammaniti and neurobiologist Vittorio Gallese, (2014) utilize the term *Intersubjectivity* to affirm that individuals are inherently relational. At a neural level a kind of enaction exists in which the self arises, thanks to the ability to map "*oneself on the other*". (2014:1)

The fourth chapter discusses an example from the field of art. In its first person account, Goethe's *Theory of Colours (1810)* exemplifies how the observation of the outer world passes through the human senses and human experience. The book was written in contrast to Newton's light studies collected in his *Opticks (*1704). His artistic/subjective approach is emblematic of a holistic method that overturns the traditional scientific method of fragmenting reality into independent parts or assuming that phenomena can exist independently of human perception, and that this approach can lead to a correct knowledge, as new scientific theories had demonstrated about colours. The chapter supports the idea that, historically, art didn't have the function of spreading scientific conceptions of time and space, but rather to exercise the human need to elaborate and metabolize knowledge at a subjective level, to humanize and integrate abstract knowledge, and therefore to create an *embodied* knowledge. In my thesis, this practice is associated with consciousness, as supported in the fifth chapter. I take into account authors, both philosophers and neuroscientists, who analyse the process in which consciousness arises, which emerges when certain circumstances are present such as the presence of a potential and indefinite field of information that must be processed at a certain rate of time— synchronously integrated into a simultaneous whole, and finally organized into a dispositional format that has been named, in very

general terms, pattern. It is affirmed that consciousness brings new knowledge, new ways of perceiving, thanks to the formation of new neural patterns from which reality can be observed according to a continuously changeable environment. In fact, the most important aspect of this process is that, according to its own nature, these newly created patterns must be continually replaced by even more new ones in a continuous genesis. In this generation of the *new*, consciousness has been associated with the creative process and the function of art. Art in fact, as shown in the sixth chapter, prevents individuals and society from being the victims of their most dangerous enemy: habit—repetitive and automatic thoughts, which are the exact opposite of the conscious way of processing information. Drawing on the exploration of different scholars, this chapter shows the human tendency to base perception on past experience, yet applying it to a different environment, which necessarily provokes disorientation and an erroneous interpretation of the present reality (Marshall McLuhan, 1968). This discussion demonstrates that creativity is a quality of the mind that responds to humankind's fundamental need to assimilate its entire experience and environment. I argue that art is a practice in which this attitude finds concrete shape through continuously generating new patterns by breaking old ones. Breaking a crystalized pattern, in other words a deeply rooted thought or belief that compels one to act automatically, makes it possible to access a higher order of new knowledge. A comparison with the Buddhist Kālachakra ritual, designed to interrupt repetitive cycles from the past and the creative practice of generating new patterns—which we found in art—suggests that art performs a similar function in the West as meditative practices do in the East. The seventh chapter presents a video installation that condenses all of the topics covered in the thesis by translating it into a metaphorical digital language. It is inspired by the Buddhist Laṅkāvatārasūtra, which utilizes the metaphor of the ocean and

the movement of waves to describe how consciousness arises. The chapter also mentions the diffraction of physical phenomena utilized by Donna Haraway (1997) and subsequently by Karen Barad (2007) to better describe a changed paradigm that has moved from the metaphor of reflection, associated with the Cartesian view, to diffraction, which asserts an entanglement between matter and meanings, object and subject. In natural phenomena, like the ocean's waves colliding with one another, a new pattern is created as a result of the interference between all the waves.

## 1. Shifts in Paradigms, Shifts in Thought

Certain historical periods are significant for their consequences, which often only first become evident in the future. Retrospectively, it is possible to retrace the historical turns that are especially laden with change, so that they profoundly transform our very way of thinking and looking at reality. New realities and different spheres of knowledge come to light, illuminated by mysterious sources that enable radical change where it was once unimaginable. The causes of these exceptional historical periods are manifold. It can be due to an already tilled ground that allows such changes to sprout, or to peculiarly favourable coincidences, or even specific cosmic events, and none of those situations would likely be considered an overarching cause. Progress and change are not only the result of the law of cause and effect, nor do they necessarily follow a logical linear sequence. This opinion is held by two of the main Western epistemologists of science: Thomas Kuhn and Paul Feyerabend.

Thomas Kuhn devoted his studies to analyse great historical breaks in scientific knowledge, and his concept of *paradigm shift* still provides a good metaphor for understanding how these shifts imply a thorough change in the observer's attitude in his/her observation of reality. In his book *The Structure of Scientific Revolutions* (1962), Thomas Kuhn introduces the term paradigm shift in his model of scientific research, to demonstrate that science does not progress in a linear and continuous way, but periodically undergoes discontinuities and revolutions that lead, precisely, to paradigm shifts, from which new approaches to the understanding of natural phenomena emerge.

Kuhn defines a scientific paradigm as:

> Universally recognised scientific achievements that, for a time, provide model problems and solutions for a community of researchers. (1962 [1970]: 111)

When anomalies are observed and the accepted paradigm is not able to solve the problems arising from the anomalies, science enters a revolutionary phase:

> Led by a new paradigm, scientists adopt new instruments and look in new places. Even more important, during revolutions scientists see new and different things when looking with familiar instruments in places they have looked before. It is rather as if the professional community had been suddenly transported to another planet where familiar objects are seen in a different light and are joined by unfamiliar ones as well. (1962 [1970]: 111)

From an analogous perspective, Paul Feyerabend, in his cutting polemic *Against Method* (1975) in which he fiercely attacks allegedly scientific rationality by studying concrete historical cases of scientific research, argues that:

> It is clear, then, that the idea of a fixed method, or of a fixed theory of rationality, rests on too naive a view of man and his social surroundings. To those who look at the rich material provided by history, and who are not intent on impoverishing it in order to please their lower instincts, their craving for intellectual security in the form of clarity, precision, 'objectivity', 'truth', it will become clear that there is only one principle that can be defended under all circumstances and in all stages of human development. It is the principle: anything goes. (1975 [1993]: 18-19)

Not only are paradigm shifts the norm, altering the perspective according to which we look at various phenomena, but it is also impossible to establish a unique method for determining when these revolutionary periods arise. In the cultural and technological transition between the twentieth and twenty-first century, a major change of paradigm came about. It was one of those exceptional moments in history in which a new vision of reality seemed to transport earthlings to another planet—without them actually stepping outside of the atmosphere. The effects and consequences of this switch in mental perception are still at work today, and provide the elements for my artistic research.

By the early 1900s, the solid knowledge that had dominated Western thought began to crumble, and the safe space that had been put between subject and object, mind and body, reason and feeling came under threat. Categories of thought that for a long time had been kept distant from each other, now began to hybridize and syncretize to create new visions and attitudes.

The first victim of the radical change caused by information technologies and networked minds was the system of thought inaugurated by René Descartes (1596-1650). Descartes developed an impeccable tool that would allow him to attain truth: methodological (or Cartesian) scepticism. Descartes understood scepticism as a tool to exclude every idea or concept seeping with doubt. He thus inaugurated a new approach in all fields of knowledge that is considered a foundation of modern culture: the principle that reason is the instrument through which one can understand reality with absolute certainty. Descartes thus posited science as the realm of absolute truth; and his idea was grounded in the enormous leap that mathematics made around that time, thanks to the invention of calculus by Leibniz and Newton. This paradigm was born within the field of physics, and was made possible by Isaac Newton's discovery of the laws of gravitation, which understood the universe as an enormous mechanism governed by forces described by precise differential equations. In fact, the whole philosophy of Descartes, and thus the mechanistic approach, makes a sharp distinction between the subject that calculates and measures, and the object that is calculated and measured, thus opening the way for a complete objectification of natural and social reality.

The world is much more complex and nuanced than has been conceived since Descartes, and this is the starting point for contemporary epistemological research. I propose to track down the developments in the areas that concern this research study—namely, the dialogue between

science and art, the growing interaction between East and West—by acknowledging that the early twenty-first century is witnessing a second paradigm shift just as radical as the one that occurred a century before, a discontinuity that is profoundly altering how humans interact with reality.

The influence of the Eastern thought in the West officially began when Helena Petrovna Blavatsky (1831-1891) founded the Theosophical Society in New York in 1875. This new philosophy attempted to combine Eastern and Western occultism, hinting towards the existence of both physical and non-physical aspects of the universe. During the 1880s, Blavatsky converted to Buddhism, and wrote numerous books to help disseminate Eastern philosophy within Western intellectual circles. Later, the Theosophical Society also spread to India and USA thanks to Jiddu Krishnamurti, the Indian philosopher who held the famous dialogues with the American scientist David Bohm, as we shall see in the remainder of his work. Jiddu Krishnamurti became a guru for many Western intellectuals of his time, especially in the United States. In Europe, theosophical values were disseminated by Rudolf Steiner, who in 1912 founded the Anthroposophical Society, building on the main concepts developed by Blavatsky. Steiner called his theories “spiritual science”. Anthroposophy posits the existence of a spiritual world, intellectually understandable and accessible by direct experience through inner growth and development. It also proposes the investigation and description of these spiritual phenomena through an observation of the soul through the scientific method, that is, by expanding the scientific method to objects that cannot be immediately accessed and sensed. However, there was a growing ideological rift between the group led by Rudolf Steiner and the original one headed by Blavatsky. Steiner was working to build a road that accepted the cornerstones of Western culture, such as Christianity and natural science; whilst the mainstream of the Theosophical Society was more oriented towards the East, in particular India.

What is important to note here is that, at this moment, the study of spiritual values begins to be associated with the scientific method, after centuries in which mind and body had been treated as separate realms. The path that leads to the application of the scientific method, historically associated with the study of the objective world, to the inner and subjective world, slowly begins to be unfolded in this context during the early twentieth century. Another way in which Eastern spiritual and ideal values were spread in Western culture was through the migration from Tibet, known as the Tibetan diaspora, which occurred in two waves: the first in 1959 following the 14th Dalai Lama's self-imposed exile in India, and the other in the 1980s, when Tibet opened trade and tourism. This diaspora has spread Tibetan Buddhism in many Western countries, where this tradition has been steadily gaining popularity, also due to the charisma and popularity of Dalai Lama himself. The spread in the West of anti-materialistic and anti-mechanistic values introduced by Eastern thought coincided with science moving in the same direction, namely showing that the subject can affect material observation.

In the early 1900s, the understanding of relativity and quantum reality determined a paradigm shift whose effects and implications are still with us today. Classical physics based on the Newtonian model posited a perfectly mechanical and predictable universe. This paradigm conflicted with the findings of relativity theory, which portrayed a cosmos where time flowed differently according to the velocity of the observer, thus forcing the scientific community to accept that there is no such thing as absolute time or fixed space. The infinitely small world of quantum mechanics challenges the common sense understanding in which objects behave in a deterministic and predictable manner, and introduces the idea that the observer, namely the scientist, in some way influences the behaviour of the particles. Reality as described by quantum mechanics

suggests the abolition of the centuries-old separation between subject and object, and dispels certainty about the objectivity of empirical data.

This paradigm shift imbued all forms of knowledge and a multiplicity of disciplines, and such massive changes in attitude and in the perception of reality could not but affect developments in art. In the early 1900s, the artistic field underwent a paradigm shift in tandem with the one that was unfolding in the scientific field. The twentieth century is the century of ideological "isms" and its artistic avant-gardes: Expressionism, Cubism, Futurism and abstract art. In 1916, the Dada Group was founded at the Cabaret Voltaire in Zurich. Surrealism was launched in Paris in 1924. A common feature of these artistic movements, which were developing in Europe and Russia, but also in America, was the radical rejection of all traditional values, and more specifically an embracing of what Marcel Duchamp allegedly called "anti art" (Tate: n/d).

These movements, particularly Dadaism, and the tremendous influence that Duchamp came to progressively acquire in their development, are linked to the predominance of concept over perception, of meaning (or absence thereof) over the material, aestheticized, artistic object.

In this context, there is a parallel change in the aesthetic paradigm of figurative painting, which is freed from its connection to perceptual data, opening up to the invisible realm of abstraction and, with it, to the representation of inner feelings and sensations through form and colour. A perfect example of this tendency is Wassily Kandinsky and Der Blaue Reiter group.

The viewer takes on an especially fundamental role in completing the sense of the artwork within the context of Dadaism and Duchamp's invention of the readymade. The readymade is the re-contextualisation of an ordinary object as artwork, in Duchamp's own words:

> The choice of the readymade is always founded on visual indifference as well as in the complete absence of taste, whether it is good or bad taste. (Duchamp-Cabanne, 1966 [2009]: 50)

This re-contextualisation is linked both to the artist's intentions, declaring that an ordinary object is now a piece of art, and to the new context in which it is inserted—an exhibition, an art fair, a Salon, as is the case of *Fountain* (1917). Most importantly, it leaves taste and aesthetic judgement out of the equation, thus almost exclusively stimulating the conceptual aspect of the work. Consequently, art undergoes a radical transformation according to which any common object can become art, if the artist decides so, and if the viewer helps to complete the sense using, in Duchamp's ideal, her/his intellectual capabilities, and leaving the exclusively "retinal", as Duchamp called them, "properties of the artwork out of the equation".

It is important to note that for Duchamp not every artwork had to be a readymade; moreover, he stated that the number of possible readymades had to be limited; otherwise the artistic effect would be lost. Duchamp did not limit conceptual art to objects, he clearly stated there is also conceptual painting; what he wouldn't accept was purely "retinal" art (Duchamp-Cabanne 1966 [2009]: 39). In 1917, Duchamp exhibited *Fountain*, a urinal which he signed as "R. Mutt", one of his first readymades, and on that occasion he stated:

> The creative act is not performed by the artist alone; the spectator brings the work in contact with the external world by de-ciphering and interpreting its inner qualifications and thus adds his contribution to the creative act. (Duchamp, 1959: 77/78)

This operation is relevant to the context of my research as it resulted in, among many other things, a new way of understanding the relationship between object and subject, or viewer and artwork, that has also progressively emerged in art. This established a short circuit between the

artwork and spectator, which is mostly due to Duchamp's gesture, and to his attitude to art in general. Consequently, this study aims to integrate fragmented and piecemeal views in order to conceive a more synthetic and synesthetic view of art, reality and of the human being who is immersed in it. It will show how the gap between subject and object, spiritual and physical, is being recomposed, and that the distance that once kept them separated is now shrinking.

Another vast and emerging area of contemporary science is the one that intends to study consciousness, the most subjective of phenomena, empirically. The cross-pollination between Buddhism and science is advantageous when these two systems of knowledge converge on the subject of consciousness. And it is precisely on the theme of consciousness, both technological and cosmological, that the present study will focus. This research advances the hypothesis that art can be conceived as a field where the subjective perspective can generate valid knowledge, and is thus able to bring about new views of reality; especially if by knowledge we mean a particular state of consciousness. Overcoming the Cartesian dichotomy between subjectivity and objectivity is the new mission for science, and in this thesis I argue that contemporary art can also provide a way to integrate what so far has been kept apart. According to the aesthetics I subscribe to, the function is to generate consciousness and states of awareness. In this light, modern neuroscience and contemporary physics must be confronted with Asian philosophy, in particular Buddhism, in their complementary explanations of the relations between mind, space and nothingness.

The origins of the paradigm shift that we actively observe today, lies in the epistemological break that Einstein's special and general relativity, Planck's quantum mechanics, and Heisenberg's uncertainty principle caused, leading to a shelving of Newtonian cosmology and the Cartesian notions of objectivity and subjectivity. Once completely banned from

science, the role of the subject was reintroduced in scientific observation, upsetting the foundations of the empirical method. So consciousness, awareness, and even spirituality, began to be considered legitimate objects of scientific study, a novelty in the West but not in the East. In art, this has created a short-circuit between object and subject in *"retinal art",* thus leading to the introduction of abstract symbols and conceptual values in modern art. Interdependence between scientific categories of thought and abstract realms of philosophy seems to be the only way to reach a more comprehensive artistic knowledge of reality in its manifold and invisible aspects. In order to lay out the conceptual framework for the development of the present work, in the next chapter we will examine the main concepts more closely, as well as the intellectual contexts in which they were born.

## 2 The Paradoxes of Contemporary Science and the End of Absolute Values.

Before delving into various conceptions of science according to epistemologists, philosophers of science and foremost scientific theorists, it is relevant to briefly address Gilles Deleuze and Felix Guattari's conception of what science is, as defined in their famous work *What Is Philosophy?* (1991). The authors attribute to science the function of calming down the human soul. However, they point out that science promised a sort of reduction of chaos, which they understand as a concept more connected with velocity than disorder.

> In the case of science it is like a freeze-frame. It is a fantastic slowing down, and it is by slowing down that matter, as well as the scientific thought able to penetrate it with propositions, is actualised. A function is a slow-motion. (1991[2002]: 118)
>
> We require just a little order to protect us from chaos. Nothing is more distressing than a thought that escapes itself, than ideas that fly off, that disappear hardly formed, already eroded by forgetfulness or precipitated into others that we no longer master. These are infinite variabilities, the appearing and disappearing of which coincide. (1991 [2002]: 200)

The authors express in philosophical terms how science has been inserted into our lives as a rigorous discipline that protects us from chaos, from a threatening environment in continual flux, as well as from our own fugacious thoughts. Science is commonly considered a field in which we can trust, a comfort zone that is able to answer any of our potential doubts. Despite Cartesian duality of mind and body and the mechanistic and materialistic character of Newtonian scientific reasoning, which still dominates Western thinking even outside natural science, a unitary worldview has shaped all forms of human thought over the last few centuries. The idea that knowledge can be measured and compartmentalized has led universities to organise accordingly: the

specialisation of knowledge in single parts to study a broader field was understood to be the right and only way to analyse reality. Specialisation is the opposite side of the coin of mechanization, according to which, as in a machine, single and separated “portions” of knowledge are to be processed separately, with the disadvantage of losing an organic and coherent vision of a certain ensemble of phenomena. As a result of the massive spread of the Cartesian paradigm, even after a century in which the vision of classical physics was abandoned, the separation of mind and body, rational and irrational, between parts and the whole, is still hard to bridge.

At the beginning of the last century, the very nature of what reality has irremediably morphed, and this new vision was also supported from a philosophical perspective. It is not only the bizarre world, alien to common sense, of quantum physics that has put established concepts such as rationality and objectivity under strain against the backdrop of the existence of absolute values, but philosophers of science such as Thomas Kuhn, Paul Feyerabend and David Bohm, to quote only a few, show that the most relevant discoveries in science were possible not only thanks to the scientific and objective method, but also to aspects of the mind more related with creativity, belief, suggestion and persuasion. These are all concepts that belong to the intuitive side of the mind and in which subjectivity takes on a new importance within the scientific landscape and puts objective values and an absolute scientific method into question. Kuhn maintains that progress in science does not proceed through a linear accumulation of knowledge, or in a rational manner, but that instead a more complex understanding of the system of elements is needed. To allow a new paradigm to be born and grow, especially in the early stages, scientists also needed a good dose of faith, which has nothing to do with mathematical models and the laws of cause and effect.

Kuhn sustains that when a scientist adopts a new paradigm his/her experience can be described as a "conversion":

> The man who embraces a new paradigm at an early stage must often do so in defiance of the evidence provided by problem- solving. He must, that is, have faith that the new paradigm will succeed with the many large problems that confront it, knowing only that the older paradigm has failed with a few. A decision of that kind can only be made on faith. (1962 [1970]. Vol. II, No. 2, :158)

David Bohm, as it will be developed further, is particularly important for this research because he maintains that art, science and religion have had a common root since primitive times. In the book *On Dialogue* (1996) he insists on the fact that science in our age is suffering from one of the biggest problems of humanity, namely, confusing, assumptions and opinions with truth:

> Science is predicated on the concept that science is arriving at truth, at a unique truth... In a way, science has become the religion of the modern age. It plays the role which religion used to play of giving us truth. (1996 [2004]: xi)

Like Deleuze and Guattari, Bohm also argues that science is used as an anchor of salvation that protects us from the uncertainty of change.

Bohm mainly attacks science at its foundation, at what our society expects these disciplines to be:

> …a system of knowledge that deals directly with truth rather than with models of reality. Science itself is demanding a new, non-fragmentary world view, in the sense that the present approach of analysis of the world into independently existent parts does not work very well in modern physics. It is shown that both in relativity theory and quantum theory, notions implying the undivided wholeness of the universe would provide a much more orderly way of considering the general nature of reality. (1980 [2005]:XV)

Science needs to solve the problem of truth, and not even that of absolute certainties, Bohm tries to give science a new function:

> Since the goal of obtaining absolutely valid knowledge has no relevance in such a situation, we are led to suggest that scientific research is basically to be regarded as a mode of extending man's perceptual contact with the world, and that the main significance of scientific knowledge is (as happens in immediate perception) that it is an adjunct to this process. (1965 [2009]:184)

Paul Feyerabend wrote his essay *Against Method* (1974) using the historical example of the Galilean revolution to show how the revolution itself was possible thanks to unscientific methods, even before the advent of quantum physics: some irrational elements persuaded Galileo to follow that path, and not another one. Feyerabend demonstrates with historical examples that science is full of incomplete theories that are nonetheless accepted, which are far from being examples of natural correspondences. He discusses the limits of empiricism, namely, that facts are sometimes arbitrarily deduced because they are observed through older ideologies, preserving older theories, and thus not always giving the chance to the best theory.

Limits can also be found in verificationism, already extensively discussed by Karl Popper in his work *The Logic of Scientific Discovery* (1934), rewritten and reissued in English in 1959. However, there are also limits in the method of falsification proposed by Popper himself; a method that, if strictly applied, would eliminate, for example, Einstein's discovery. Furthermore, according to Feyerabend, scientific discoveries are characterised by political and economic interests and are much less rational than scientists would have us believe:

> Science is not only one of the many tools that man has invented to suit the environment. It is not the only, and is not infallible, and has become too powerful, too driven, and too dangerous to be left to himself (1975 [1973]: 160).

To be able to understand what happened with empirical science, some of the new laws and discoveries that totally changed the way one perceives

reality at a physical level during the twentieth century, both the infinitely small and the infinitely large, will be synthesised. Around the beginning of Einstein's career, he thought that Newtonian mechanics were no longer enough to reconcile the laws of classical mechanics with the laws of the electromagnetic field, as described by the Maxwell's equations. From 1905 to 1916 Einstein presented two theories of relativity. In 1905, with the first version, time could no longer be considered as an absolute value, but it had to be relative to another element: space. Einstein's theory challenged the conception of space and time entities that are independent from each other. The theory of relativity advances spacetime as a unified entity of space and time. Time and space are dependent because, if it is true that the velocity of light is constant independently from the position of the observers, and nothing travels faster than light (and it will be shown later how this last assumption is in contradiction with entanglement phenomena), it also true that observers moving at different speeds cannot agree on time coordinates.

Later, in 1915, in a second stage of the general theory of relativity, Einstein includes gravity in the space-time model. From this moment on, space, time and mass cannot be seen as absolutes, existing in themselves but they are intertwined in a relational fashion. With Einstein's discovery of the equivalence of mass and energy—and his famous equation, E=mc2—the fields of physics and astronomy were completely transformed. David Bohm dedicated an entire book to Einstein's revolution: *The Special Theory of Relativity* (1965). The book was conceived for the students of the Birkbeck College in London, its purpose was to explore all the implications of the relativity theory, not only scientifically but also from a philosophical and psychological point of view. The book aptly expresses how difficult it is to fully understand the theory of relativity:

> …largely because this relationship contradicts certain "hidden" assumptions concerning the general structure of the world, which are based on "common sense", and its development in Newtonian mechanics. (1965 [2009]: Viii)

In fact, it is commonly believed that Newtonian concepts are in complete agreement with everyday perceptual experience, while the relativity theory is on a radically new line that contradicts Newtonian concepts:

> Einstein's basically new step was in the adoption of a relational approach to physics. Instead of supposing that the task of physics is the study of an absolute underlying substance of the universe he suggested that it is only in the study of relationships between various aspects of this universe, relationships that are in principle observable. (1965 [2009]: Vii)

But the experiments conducted in the field of quantum physics are even harder than Einstein's theories of relativity to be accepted and understood. This branch of physics studies matter at the subatomic level, the infinitely small. Instead, Einstein's theory of relativity is about the infinitely large, about heavy and huge cosmic masses and forces present in the universe. While, as mentioned above, Einstein's theory contests the idea that time, space and mass are absolute and independent elements, in 1927 Werner Heisenberg's uncertainty principle formalised the limits of human knowledge within the system of physics. Heisenberg not only confirms Einstein's theory about the relative nature of time and space, affirming that there are no absolute values without any degree of relations with elements of the same system, but also destroys one of the most powerful tools in science: measurement. Heisenberg's principle asserts that it is impossible to measure two variables in a system simultaneously in absolute way: that is to say that if the scientist chooses to learn an electron's momentum, he/she has to give up learning its position, and vice versa. Consequently, one needs to accept that if it is impossible to determine simultaneously the position and the momentum of an electron, or of any other particle, with any degree of certainty, it is

therefore impossible to predict the electron's trajectory. Position and momentum are complementary properties because to know one is to lose track of the other; they coexist but are mutually exclusive: in fact, this law quantifies the extent to which knowledge about one of these properties limits the possible knowledge about the other.

Werner Heisenberg had been an assistant to Niels Bohr at the Institute of Theoretical Physics in Copenhagen (which today is aptly named the Niels Bohr Institute) during the 1920s, when they helped develop what today is called quantum mechanics theory. In 1929, Heisenberg was invited to give a series of lectures at the University of Chicago to explain the new field of quantum mechanics. The lectures then served as the basis for his book *The Physical Principles of the Quantum Theory*, published in 1930. Thus, between 1925 to 1927, Niels Bohr and Werner Heisenberg discussed about the paradoxes encountered in quantum physics, what was dubbed as "the Copenhagen interpretation", which expresses the idea that physical systems do not generally have definite properties prior to being measured, and thus scientists can only formulate predictions on results in terms of probability. The act of measurement affects the system, causing the set of probabilities to reduce to only one of the possible values immediately after the measurement. Electrons in a laboratory have only potential existence until they are observed. Once observed, with a measuring device, this potentiality "collapses" down into the concrete manifestation of the actual particle.

All these potential states (the states before a measurement) can be described by Ervin Schroedinger's *wave function*: a single mathematical function that describes the entire system, including all the particles in it. The wave function is therefore only an abstraction, a mathematical model. In quantum mechanics it is said that wave function collapses when a wave function is under observation, reducing all the system's potential: the potential disappears to make space to a partial view of the

phenomena (the subatomic particle's momentum or position). Einstein disagreed about the probabilistic view of quantum mechanics. He believed that particles do have definite positions and momentums, independently from the existence of an observer and measurement; he thought the uncertainty principle did not adequately represent the natural rules of the subatomic realm. But he was uncharacteristically wrong, as subsequent experiments have confirmed.

There are two fundamental experiments that have exposed the logical paradoxes of contemporary physics, which still remain inexplicable according the traditional Western conception of the universe. The first paradox is the dual nature of light, which can be observed both as wave and a set of particles. The second is known as the property of "entanglement" and it contradicts Einstein's principle that nothing can travel faster than the speed of light. The experiment that evidences the dual nature of light is called the double-slit experiment and it shows how the light behaves as a particle or as a wave depending on how the experiment is set. It consists in firing an electron at a time through an interference barrier with two slits. Behind the barrier there is a photographic plate able to register the electron once it passes through the slits. When one slit is open each electron leaves a trace on the photographic plate, which indicates that the electron is a particle. If both slits are open instead, the electrons pass both of them at the same time, as indicated by a wavelike pattern left on the photographic plate. In normal experience, one would expect that what is a wave cannot be a particle, yet at the quantum level, light appears to be a contradiction because it behaves as both. Depending on the setting of the experiment, light will show its double nature as reported by Anton Zeilinger in the book, *The New Physics And Cosmology* (2004):

> The important point which is new in modern physics is that the observer, the experimentalist, decides by choosing the apparatus

> which one of the two features, particle or wave, is a reality. The observer has a very strong influence on nature, which goes beyond anything in classical physics. (2004:17)

Besides this phenomenon of the Wave-Particle Duality observed during the double slit experiment, another paradox emerges: during the experiment, single electrons are sent to the metal surface. It is impossible to predict the trajectory of the electron even if, after more electrons are sent, all of them will create a predictable pattern. This is the second paradox: randomness for the individual particles and a predictable pattern for the ensemble. The other experiment of fundamental importance shows the existence of entanglement, from which emerges the non-locality phenomenon. In 1935, together with Boris Podolsky and Nathan Rosen, Einstein published an article entitled *"Can a Quantum Mechanical Description of Physical Reality Be Considered Complete?"*. The article was actually written to demonstrate the incompleteness of quantum physics in 1935, even if, paradoxically today, it is recognised as the first demonstration of quantum entanglement. It was supported by a thought experiment invented by Einstein-Podolsky-Rosen (also called EPR paradoxes). The idea of the mental experiment conceived by Einstein and his colleagues consisted in that, if we have two particles and they share the same quantum state for a certain time, once they are separated and sent far into space, they can influence each other instantly at whatever distance they are. This situation betrays the reality principle founded on the assumption that nothing can travel faster than light. In the article, they had to admit that the paradox encountered in quantum systems were right (the instant influence of particles far in the space), but they hypothesised that the result of the measurements of such entanglement was determined in advance by the existence of so-called local hidden variables. A couple of months after the three scientists published the EPR paradoxes, Erwin Schrodinger wrote a letter in

response to Einstein's article. It was in fact Schroedinger who coined the term *entanglement* to indicate this behavior of subatomic particles:

> When two systems... enter into temporary physical interaction... and when after a time of mutual influence the systems separate again, then they can no longer be described in the same way as before, by endowing each of them with a representative of its own. I would not call that one but rather the characteristic trait of quantum mechanics, the one that enforces its entire departure from classical lines of thought. By the interaction the two representatives [the quantum states] have become entangled. (1935: 807–812)

Entanglement fundamentally challenges our conventional conception of objects as entities that have a persistent and unambiguous set of attributes. Quantum attributes can be ambiguous and nonlocal, as shown by the double nature of the light and by the behavior of non-local particles. The philosophical implications of this ambiguity and uncertainty of quantum reality are huge and not all scientists have agreed about the cause from of these phenomena—as was the case for Bohr and Heisenberg, who attributed them to a probabilistic nature. The debate between Bohr and Einstein—in which Einstein's refusal to accept the validity of Heisenberg's uncertainty principle is reflected in his famous exclamation "God does not play dice!"—took place because of Einstein's unshakeable belief that reality could be perceived in a deterministic way, that it was ontologically autonomous. In agreement with Einstein—who refused the probabilistic method of quantum physics proposed by the Copenhagen interpretation—was David Bohm, who also affirmed that a hidden local variable does exist, even if he based it on another principle.

In fact, Bohm devised a different type of hidden variable than Einstein, which is known as Bohmian mechanics, or the Bohm approach. In his book, *"Science, Order and Creativity"* (1987), Bohm suggested that there is no need for instantaneous action at a distance because the

particles are not separated at all but are organised by a system that works like a whole. Rather, he suggests that quantum objects follow paths that are determined by a guiding equation. Bohm tended to think that reality unfolds on several different levels, and that there are levels that are not accessible to human beings. He arrived to this conclusion while observing plasmas (high density gases filled with positive electrons and ions). Bohm quickly realised that once electrons become part of a plasma, they stop behaving like individual particles, and start behaving as if they were part of a much larger, interconnected whole: an ocean of particles that give the impression of being alive, intelligent and conscious thanks to characteristics of self-regulation that can be described observing them. The results of these observations led Bohm to deduce that reality is made up of two levels: one explicate and another implicate. The implicate order informs the explicate order, which is the one we all perceive in our own reality. The implicate order works as a background, and it is so huge that it is not perceptible by our senses. Bohm accepted the non-locality principle, but added to it the idea that the motion of particles is governed by a hidden "guiding wave", a function of the implicate order. Accepting the non-locality law, namely, that events occurring at any point in space can instantly influence other events taking place at a distance, meant to attribute an a-temporal nature to the implicate order. The implicate order is a space in which the quantum potential can act instantaneously due to its nature according to which space and time are properties of this realm of indivisible wholeness. Bohm uses as a metaphor to explain how the quantum potential works: the ship, as a particle, arrives in the port thanks to the guidance of radar's waves. The radar is the quantum potential that instantly indicates each particle where to go. The space is just an immediate medium where information guides elementary particles. The wave function acts as a pilot wave, guiding the particles. This is the function guide that underlies

the implicit order, an order too big and complex to be observable. The complexity and depth of Bohm's vision leads to the assumption that reality is fundamentally about the inseparable connection between the quantum level and the whole universe, and the elements that have a relatively independent behavior are only particular and contingent forms into this whole. Thus Bohm adhered to a totally holistic view of the universe. The entanglement debate found its end in 1982, when finally all quantum theories were validated by an experiment that proved Einstein's theory to be wrong, namely, that "spooky action at a distance" does exist.

In that year, a team of researchers at the University of Paris, led by physicist Alain Aspect, demonstrated that Einstein's local hidden variables theory was not valid. The experiment was based on the detection of two single photons emitted together from the same source: both photons were sent in the opposite direction to one another and were sensed respectively by two detectors, following the opposite direction of the two photons. In this "entangled" state, the measurement of the polarisation of a photon enables the exact information on the polarisation of the other to be deduced: in other words, the observation of the state of a photon allows the state of the second photon to be read. This was the proof that when placed in determinate conditions—in which they share the same quantum state—electrons can communicate with one another instantly, independently of the distance between them. More recently, in 1998, Arthur Zeilinger and others have improved these experiments confirming the results in agreement with theoretical predictions. Moreover, they transferred the properties of light particles at a certain distance to other particles of light, with no time delay: What is being transferred are properties, not matter. Those experiments seemed to work better with particles of light than with atoms, or large objects. However, in 2011, a team led by Ian Walmsley, a physicist at the University of Oxford, succeeded in forcing two diamonds of a diameter of about one

millimetre to enter a state of entanglement at a distance of fifteen centimetres from each other, thus demonstrating that this quantum feature can be produced and observed even at a macroscopic level. As Zeilinger affirms, the most interesting part of those experiments is that

> Entanglement is broken when one of the two particles interacts with an outside system such as a detector. In other words, once the detection is made, there is no entanglement for future observations. The first observation breaks the entanglement. (Zeilinger 2004: 24).

Observing certain phenomena that would, if left free to act independently of any observation, behave differently, we are changing these same phenomena. This kind of experiment proves that the idea that the existence of something like an objective reality independent of any observer must be seriously questioned. Scientists still cannot explain the contradiction they have encountered, which has allowed the generation of multiple points of view, which oscillate between those who believe that a reality exists regardless of who observes it and those who maintains that human consciousness is decisive in defining matter.

Princeton physicist John A. Wheeler (1911-2008)—who coined the term "*black hole*"—believed that the term "observer" should be replaced by the term *"participator"*. This replacement, he felt, would explicitly point out the radical new role of consciousness in physics. He claimed not only that the behavior of a particle changes depending on whether it is observed or not, but the same expectation of the investigator is part of the creation of the result.

> The universe does not exist "out there", independently from us. We are inescapably involved in bringing about that which appears to be happening. We are not only observers. We are participators. In some strange sense, this is a participatory universe. Physics is no longer satisfied with insights only into particles, fields of force, into geometry, or even into time and space. Today we demand of physics some

> understanding of existence itself. (John Wheeler quoted in Denis Brian 2001: 127)

Wheeler suggests that the term "participator" demonstrates the mystical nature of new physics. Similarly, Jack Sarfatti (1939), a theoretical physicist who investigated the relationship between quantum physics and states of consciousness, argues that the mind may be crucial to the structure of matter. So we are what we see or we see what we are? In other words, is the universe a projection only made possible by the active role of our minds? Is consciousness the only tangible thing in the constantly accelerating and expanding cosmos?

## 3. Buddhism's Reintegration of the Subject into Physical Reality

Foucault, during the lectures at Collège de France between 1981 and 1982 entitled *L'herméneutique du sujet* (2001a) (The Hermeneutics of the Subject) defined as the "Cartesian Moment" the break in Western culture by which subject and knowledge are no longer intrinsically bonded, so that subjectivation is experienced as an internalisation of a norm that determines the subject from outside. According to Foucault "care of oneself" and "know yourself" are concepts that for a long time were considered together, but at a certain point were split apart along the Cartesian-Kant axis. This bond was not broken once and for all, but became hidden and concealed (Foucault 1982). With Descartes and Kant, philosophy acquires absolute power over knowledge. This power arises from the assumption that the limits reside entirely in the very structure of the knowing subject, who may not have direct access to knowledge:

> I think that Descartes has broken with this when he said that to arrive at the truth, for any subject it is sufficient to be able to see what is obvious. Evidence replaces ascesis at the point where the relationship with the Self intersects the relationship with others and with the world. The relationship with the self no longer needs to be ascetic to get in touch with the truth. In order to learn the final truth, it is sufficient that the relation with the self reveals the manifest truth of what one can see for oneself. Therefore, one can be immoral yet one can know the truth. I think this is an idea that, more or less explicitly, was rejected by all previous culture. Before Descartes it was not possible to be impure, immoral, and also to know the truth. With Descartes, the immediate evidence is sufficient. After Descartes, we have a subject of knowledge that is not ascetic. This transformation enables the institutionalization of modern science. (Foucault 2001a: 15)

In the same text, he offers a definition of philosophy in order to distinguish it from spirituality. Philosophy is the discipline that intends to find the limits

and possibilities of the subject's access to truth, while attempting to allow this access through study. On the contrary, spirituality does not take this access for granted. To attain truth, the subject must deserve it. It must change and elevate itself in order to earn this access. Thus, there is no access to truth without a radical transformation of the subject. It is therefore evident how modern philosophy conceives of a static subject, while spirituality considers the truth as something permanent while the subject constantly changes in order to hopefully attain said truth.

Ancient thought had a rigid conception of the object, which remained static and unchanged. The subject, however, was considered mobile and capable of shifting. With Descartes, and modernity, this dualism is overturned, and replaced: a static subject and changing object. The active and changing pre-Cartesian subject is the subject that Foucault refers to when giving his definition of the subject as a form that is never the same, which reconfigures itself in its interaction with different apparatuses and instances. As he stated in an interview from 1984, Foucault's main topic of interest was that of the relationship between subject and truth (1994: 273-294). He resisted any definition of subject as a substance, or any *a priori* definition of the subject, because Foucault defines the subject as form, and "above all, this form is never identical to itself" (274). In his view the subject is never the same, not in the sense that one is true and the other is false or simulated, but rather that the subject's relationship with itself always varies depending on the context. Above all, this is a conception of an active subject. The present thesis is based on the assumption that subject and object are mutually interdependent, both active and changing. This is interesting to note as the new weight given to subjectivity in modern physics corresponds to an increased interest in Buddhist thought, with its emphasis on mind over matter. To quote Niels Bohr, father of the Copenhagen interpretation:

> For a parallel to the lesson of atomic theory [we must turn] to those kinds of epistemological problems with which already thinkers like

> the Buddha and Lao Tzu have been confronted, when trying to harmonize our position as spectators and actors in the great drama of existence. (1958: 20)

It seems that Buddhism can be used as an instrument to reconcile objectivity and subjectivity, the latter having been long relegated to the margins of true knowledge. Unlike asceticism, however, Buddhism does not deny or sacrifice the body to reach high levels of morality and knowledge. On the contrary, Buddhism is taken as a model in which the mind and body live peacefully together and mutually reinforce each other, creating a particular kind of knowledge that has came to be called *embodied knowledge*. (Varela, Thompson, Rosch 1993)

The first full-fledged account of the connections between Western science and Oriental philosophy was provided by Fritjof Capra in his book *The Tao of Physics: An Exploration of the Parallels Between Modern Physics and Eastern Mysticism* (1975), which explores how a holistic vision, a prerogative of Eastern spirituality, enmeshed with modern quantum physics can provide a better portrait of mind-in-nature. In 1987, the neuroscientist Francisco Varela, together with attorney and entrepreneur Adam Engle, promoted a series of conferences called Mind and Life, in which the Dalai Lama met scientists from various research fields. The conference has taken place every two years since then, giving rise to a host of publications and a Mind and Life Institute in Virginia, which organizes symposiums, scholarships and grants, in order to continue the original mission of bridging the split between objective science and individual needs and thus foster progress in human well-being. The numerous meetings with the best minds of Western science and the Dalai Lama testify to the rich terrain of discussion and knowledge to be integrated, as well as the need to fill epistemological blanks from both systems of thought.

Before going on to analyse specific concepts associated with Western science, it is appropriate to briefly trace a history of the basic principles of Buddhist thought. Buddhism is not a homogeneous and linear millenary tradition: many schools of thought can be found within it. In general terms, Buddhism is a current of thought that had its origins in India and spread over the years in China and Japan. Its practices, traditions and beliefs follow the teachings of Siddhartha Gautama, better known as Buddha, who lived between the VI and IV BCE. Buddhists recognise Siddhartha Gautama as an enlightened being who through his teachings helps them go through suffering in this life to reach nirvāṇa. The two main Buddhists schools, or branches are, the "Great Vehicle" (*Mahāyāna*) and the "Lesser Vehicle" (*Hīnayāna*), later turning into the *Theravāda*. Theravāda is the branch of Buddhism that considers the teachings of the *Pāli* canon—a collection of the oldest conserved Buddhist texts—as its doctrinal core, but also includes a rich diversity of traditions and practices that have developed over its long history of interactions with different cultures and communities. In the nineteenth century a process of mutual influence between Asian Theravādins and Western audiences interested in ancient wisdom began. Helena Blavatsky and Henry Steel Olcott, founders of the Theosophical Society, had a particularly profound role in this process. A lay Vipaśyanā practice developed in Theravāda countries. From the 1970s on, the surge of Western interest in Oriental religion propelled the growth of the Vipaśyanā movement.

The Mahāyāna tradition is the branch of Buddhism followed by the Tibetan head monk Dalai Lama. Tibetan Buddhism also adds to Mahāyāna teachings the more recent Vajrayāna tradition (from the sixth to the seventh century CE): a syncretic tradition designed to accelerate the process of enlightenment in this life, also known as Tantric Buddhism, Tantrayāna, Mantrayāna, Secret Mantra, Esoteric Buddhism, Diamond Way, Thunderbolt

Way, or the Indestructible Way. Despite all of these different forms, for most Westerners the word "Buddhism" still primarily evokes Tibetan Buddhism.

Regardless of historical sedimentation and geographical differentiation, the Four Noble Truths (*catvāri āryasatyāni*) are regarded as the central doctrinal kernel of the whole Buddhist tradition, and are said to provide a conceptual framework for all of Buddhist thought. These fundamental truths are: (1) Existence is characterised by suffering; (2) The cause of suffering is desire or grasping; (3) cessation of suffering is possible; (4) The path of meditation and intellectual understanding taught by the Buddha leads to the cessation of suffering. The concept of liberation (*nirvāṇa*)—the ultimate goal of the Buddhist path—is closely related to the overcoming of ignorance (*avidyā*), i.e. fundamental misunderstanding or misperception of the nature of reality. In awakening to the true nature of the self and all phenomena, one develops dispassion for the objects of clinging, and is liberated from suffering (*duḥkha*) and from the cycle of incessant rebirths (*saṃsāra*). To this end, the Buddha recommended viewing things as characterised by the Three "Marks of Existence", which are somehow the obverse of the four truths. The "Three Marks of Existence" are impermanence, suffering and not-self. Impermanence (*anitya*) expresses the Buddhist notion that all compounded or conditioned phenomena (all things and experiences) are inconstant, unsteady and impermanent. All that can be experienced through the senses is made up of parts, and its existence is dependent on external conditions. Everything is in constant flux, and so conditions and the thing itself are constantly changing. Things are constantly coming into being, and ceasing to be. Since nothing lasts, there is no inherent or fixed nature to any object or experience. According to the doctrine of impermanence, life embodies this flux in the aging process, the cycle of rebirth, and in any experience of loss. The doctrine asserts that because things are impermanent, attachment to them is futile and leads to suffering (*dukkha*). In relation to emptiness, the third mark of existence, Mahāyāna Buddhism was given significant

theoretical grounding by Nagarjuna (around 150–250 CE), possibly the most influential scholar within the Mahāyāna tradition. Nāgārjuna's primary contribution to Buddhist philosophy was the systematic exposition of the concept of *śūnyatā*, or "emptiness", widely attested in the Prajnāpāramitā sutras. The doctrine of emptiness brings together other key Buddhist concepts, particularly the *anattā* and *pratītyasamutpāda* (dependent origination), to refute the metaphysics of Sarvastivada and Sautrantika schools. For Nāgārjuna, all phenomena (dharmas), either organic or inorganic, are without any *svabhāva* (literally "own-nature" or "self-nature"), and thus without any underlying essence; they are "empty" of being independent. Nāgārjuna's school of thought is known as the *Mādhyamaka*. Some of the writings attributed to Nāgārjuna make explicit references to Māhayana texts, but his philosophy was argued within the parameters set out by the Agamas (a collection of scriptures of several Hindu devotional schools). Later Pali literature has also used the phrase Middle Way, to refer to Mādhyamaka school, in which the Buddha's teaching of dependent origination proposed a way to bridge the extremes of eternalism and annihilationism, texts collected, in the book Madhyamaka-kārikā, or *Fundamental Verses on the Middle Way.*

Although it possesses an extremely vast network of theoretical knowledge, Buddhism is founded upon knowledge that is born from within, from subjective experience. In Buddhism, it makes no sense to speak of a kind of reality that is removed from the relationship with the observer with a subject able to reach a certain degree of truth. A circularity exists with different levels of relationship and interdependence of things or concepts—and without this nothing would exist. In Buddhism, emptiness is a characteristic of phenomena arising from the observation that nothing possesses an essential, enduring identity or essence. Emptiness means that everything one encounters in life is empty of an absolute identity. This is because

everything is inter-related and mutually dependent, never wholly self-sufficient or independent. All dynamic things are in a state of constant flux where energy and information are forever flowing throughout the natural world.

Francisco Varela was certainly the key figure who has dedicated all of his scientific research to integrating the subject in the process of acquiring or producing knowledge. His research in neuroscience sought to include direct perception in first person in academic scientific studies, to combine the phenomenological method with neurosciences, coining the term for this new branch of research: neurophenomenology. To accomplish this ambitious project, he also managed to include and apply some Buddhist concepts in the academic context of neuroscience. The book *The Embodied Mind: Cognitive Science and Human Experience*, which Francisco Varela wrote with Evan Thompson and Eleanor Rosch in 1993, is devoted to bridging this gap and proposes a circularity between the theoretical level and the immediate experience, an emergence due to the dominant authority typically ascribed to science, which often denies the immediate and daily experience. The book is an attempt to build a bridge between the mind in science and the mind in experience through articulating a dialogue between two traditions of Western cognitive science and Buddhist meditative psychology:

> Our concern is to open a space of possibilities in which the circulation between cognitive science and human experience can be fully appreciated and to foster the transformative possibilities of human experience in a scientific culture. This pragmatic orientation is common to both partners in this book. On the one hand, science proceeds because of its pragmatic link to the phenomenal world; indeed, its validation is derived from the efficacy of this link. On the other hand, the tradition of meditative practice proceeds because of its systematic and disciplined link to human experience. (Varela, Thompson, Rosch 1993: XVIII)

The gap to be filled between the objective world and the subjective world invests not only modern physics but also our daily lives based on ordinary perception and common sense. Subject and consciousness must be included in scientific observation, but also the subject must be the first target of new discoveries, because of complexity and abstraction have risen greatly for the new vision of reality to be metabolized at an individual level.

By ignoring the existence of a subjective world, with its emotions, feelings and thoughts, we lose the richness, texture and quality of reality, so that our understanding of it cannot be comprehensive, with the risk of detaching human needs from scientific insight. Therefore, a kind of art that can reconcile the inner and outer worlds, the level of daily experience with the level of increasingly complex theories can function as an antidote against the sense of disconnection and isolation in which the individual is likely to find himself/herself, since she/he is no longer capable of grasping the import of new scientific discoveries, sensing them as threats rather than benefits.

The social theorist and philosopher Marshall McLuhan repeatedly warned against the same disconnection. McLuhan, concerned as he was with understanding the effects of technology on society and the individual, understood technology not only as “an extension of man” (McLuhan1964), but as a concrete expression of the wonders of science. From the field of media theory, of which he can be considered the founder, McLuhan reasoned that the individual’s identity could be wounded or mortally endangered by the innovations in electronic technology. It is at this point that the individual reacts with the development of “*self-defence mechanisms”* (McLuhan 1996). Thus, new science and technologies that are not properly assimilated by society at the subjective level can unleash a violent backlash. Varela argues that in order to attain embodied knowledge, we can refer to the Buddhist tradition, because in it every concept or theory

is supported by a series of subjective practices that verify effectiveness and validity, making them amenable to be absorbed by individuals, because the description of the functioning of the mind proposed by the Buddhist tradition has always been conceived in tandem with pragmatic living. A system of reflection is therefore proposed that abandons the abstract activity in favour of an incarnated activity in which body and mind are brought together. In particular, the techniques of mindfulness deriving from the long tradition of Buddhist practice (especially in its Vipassanā version) are applied to the knowledge reached by cognitive science. Mindfulness meditation is a response to the fact that people are normally not mindful of what they are doing or thinking with the consequence that body and mind are seldom closely coordinated.

> mindfulness techniques are designed to lead the mind back from its theories and preoccupations, back from the abstract attitude, to the situation of one's experience itself. (Varela, Thompson, Rosch 1993: 22)

Another idea that arises from the text is the continuous circularity between world and mind. In order to be able to explain it properly, the authors utilize the term "enaction". Enaction fosters the idea that the possibilities of cognition imply neither the world nor the mind as an a priori, but that is through the intertwinement and interaction of both in a certain moment in history that a certain being comes to know. The concept of enaction thus entails a deep critique of the idea that the mind somehow reflects nature, but goes further to be able to know it through science and its methods. It is precisely this idea that knowledge and cognition can only happen through experience, that is to say that cognition can only be embodied, so to get an antidote to prevent a detachment between mind and body, real life and mental abstraction. In the Buddhist tradition of meditative practice and pragmatic philosophical exploration, enaction corresponds to the doctrine of no-self (the denial that there is a primary self, without any degree of relationship between elements) and in general to the non-dualistic view

presented by the Buddhist philosopher Nagarjuna in the Madhyamika school.

In all of these concepts or doctrines there is the idea that what governs life is a fundamental and continual circularity between world and mind. Francisco Varela felt the urgency to link cognitive science, and science in general, to human experience and he never stopped referring to Buddhist tradition as a place where this gap could be filled. The Dalai Lama's book "*The Universe in a Single Atom"* is a good synthesis of the dialogues regarding science and Buddhism that occurred during Varela's Mind and Life meetings. The Dalai Lama clearly explicates why a dialogue between Western science and the Buddhist system of thought is urgent today and on which grounds it can unfold. While science can use the rich complexity of Buddhist thought to fill some gaps left by the philosophical paradoxes of quantum physics from the point of view of the mechanisms that regulate the functioning of the mind; Buddhism can benefit from integrating the new frontiers of science with ancient theories that today are too rudimentary compared to the current sophisticated scientific demonstrations:

> It may be that science will learn from an engagement with spirituality, especially in its interface with wider human issues, from ethics to society, but certainly some specific aspects of Buddhist thought—such as its old cosmological theories and its rudimentary physics—will have to be modified in the light of new scientific insights. (2005 [2008]: 5-6)

In fact, in the last decades the Dalai Lama engaged deepening his knowledge of Western science, and in doing so, he has also stimulated young Buddhist monks to have an open mind regarding this knowledge.

Scepticism is the common attitude thanks to which a dialogue between Western scientists and the spiritual Buddhist leader is possible, as the Dalai Lama remarked many times during the conferences. It is with this attitude,

accompanied by openness in the discussions and the free exchange of ideas with no predetermined rules that such dialogues have been taking place. Both Buddhism and science share the bias for empiricism. Even if their methodologies are profoundly different, both have to prove a hypothesis with facts. In fact, Buddhist thought, contrary to the commonly held concept of religion, does not rely entirely on sacred texts for doctrine, but rather these constitute the theoretical support to guide spiritual practice, and any content of Buddhist ancient scriptures must be verified with subjective experience.

Although they share a common epistemological stance, the methods of science and Buddhism couldn't be more different. Scientific investigation proceeds by experimentation, using instruments that measure external phenomena, whereas contemplative investigation proceeds by the development of refined attention, which is then used in the introspective examination of inner experience. To generalize, it can be said that Buddhism utilises a first-person method of inquiry, while Science adopts a third-person method of inquiry, using instruments for observations that can replicated by anybody. However, as explained in the previous chapter, quantum physics tells us that the idea of an absolute and objective reality can no longer be maintained: measurement and even the experimenter's presence can influence the behavior of physical objects. In the book *The Universe in a Single Atom*, the Dalai Lama calls for an integration of both methods, the objective "third person" used by scientific disciplines with the help of sophisticated instruments, and the subjective "first person" used by contemplative disciplines: an integration that could improve humankind's knowledge and alleviate affliction and reduce conflict.

Buddhism's practical philosophical methodologies have been developed for centuries with an empirical attitude that has foregrounded subjective needs,

with practices able to reconcile the different levels of existence. Buddhism, in fact, offers a vast range of practices and techniques that allow putting subjective experience under analysis, not so far, from a certain point of view, from the scientific methodology. Both in the scientific method and in Buddhist logic it is possible to find tools to carry out deep research on the world, which are by far more suitable than the assumptions about the world of ordinary common sense. Another point of contact on which scientists agree is that neither quantum physics nor Buddhism accept the idea of an independent and objective reality. In this respect, the theory of vacuity in Buddhist philosophy, in which one has the certainty that every event or object has no intrinsic or independent existence, can be considered the analog of the conclusion reached by scientists that the subject and object of an investigation cannot be separated from one another.

Nāgārjuna advanced his position by criticising the shortcomings of both the realist position of Abhidharma scholars and the idealism of the Cittamatra, or mind-only school. Madhyamika is proposed as a middle way between these two extreme positions. It is a subtle and complex position, which is widely held in Tibetan Buddhism to be the most advanced philosophical treatment of questions about the nature of reality. For the Mādhyamika school, if you investigate an object that seems to exist outwardly, nothing is revealed that may be considered as an objective entity if you seek the essential nature of the phenomenon only from this perspective. It ends up being something impossible to discover by analysis, but that still exists in the conventional manner through its designation or indication verbal and / or conceptual. At the end, the principle affirms the existence of a conventional world. Nāgārjuna indeed argues for the notion of the “Two Truths”. The conventional truth represents the only means of accessing the ultimate truth (Emptiness). The idea of a conventional world can also be found in the scientific context, when Ignazio Licata, an Italian theoretical

physicist, professor and scientific director of the Institute for Scientific Methodology in Italy affirms in his essay "Science as Art of Knowledge":

> What is relevant to note about scientific languages is that they have nothing inherently objective, rather they are intersubjective, they are instruments shared by the community to face certain ranges of experiences. Every scientific constrained language arises not so much from the application of a universal recipe but bears the unmistakable mark of cultural, conceptual and creative choices of those who built it. (Ignazio Licata, 2008)

Reality is just a thing on which humans agree. As the Dalai Lama pointed out, this topic about the nature of reality has long been a focus of discussion in Buddhist thought.

> On one extreme are the Buddhist "realists", who believe that the material world is composed of indivisible particles which have an objective reality independent of the mind. On the other extreme are the "idealists," the so-called Mind-only school, who reject any degree of objective reality in the external world. They perceive the external material world to be, in the final analysis, an extension of the observing mind. There is, however, a third standpoint, which is the position of the Prasangika school, a perspective held in the highest esteem by the Tibetan tradition. In this view, although the reality of the external world is not denied, it is understood to be relative. It is contingent upon our language, social conventions, and shared concepts. The notion of a pre-given, observer-independent reality is untenable. As in the new physics, matter cannot be objectively perceived or described apart from the observer—matter and mind are co-dependent. (2005 [2008]: 65)

If a certain resonance between the conception of what reality is can be found between the new frontiers of quantum physics and the philosophical principles of different Buddhist schools, the same can be said about the notion of time, and more precisely regarding the relativity of time, about which many similitudes can be detected. In fact, Buddhist philosophy is no alien to a conception of time as a relative dimension, as the Dalai Lama pointed out in *The Universe in a Single Atom*:

> Before the second century CE, the Sautrantika school argued against the notion of time as absolute. Dividing the temporal process into the past, present and future, the Sautrantikas demonstrated the interdependence of the three and argued for the untenability of any notion of independently real past, present and future. They showed that time cannot be conceived as an intrinsically real entity existing independently of temporal phenomena but must be understood as a set of relations among temporal phenomena. Apart from the temporal phenomena upon which we construct the concept of time, there is no real time that is somehow the grand vessel in which things and events occur, an absolute that has an existence of its own. These arguments for the relativity of time, subsequently developed by Nagarjuna, are primarily philosophical, but the fact remains that time has been perceived as relative in the Buddhist philosophical tradition for nearly two thousand years. (2005 [2008]: 61-62)

If quantum physics requires a new way of thinking about the physical realm —in which matter loses part of its concreteness by revealing its changing nature once it comes in contact with an observer—studies on the mind also make a qualitative leap, once the secure demarcation between mind and body cannot be considered a solid starting point anymore. Enaction is a concept that can be applied not only to the continuous circularity between the world and the mind but also between cognition and emotion. Recent studies in many fields have postulated the failure of this attempt to reduce the subject's power in its access to knowledge in favour of an alleged objectivity that fosters the idea that phenomena can be divided and categorised to better analyse them, not only in the physical world but also in the mental and psychological sphere.

The collective book *Destructive Emotions* was born out of the dialogue between the Dalai Lama and a group of psychologists, philosophers and neuroscientists, and was produced as a result of one of the meetings of Mind and Life. In it, the Dalai Lama remarks that the traditional Western

separation of emotion and cognition no longer be supported after the recent findings from neuroscience:

> Apparently, the brain does not make any clean distinction between thought and emotion, given that every region in the brain that has been found to play some role in emotion has also been connected with aspects of cognition. The circuitry for emotion and for cognition are intertwined—just as Buddhism posits that these two elements are inseparable. (2000:110)

When it comes to the understanding of how the mind works, Buddhism has a centuries-old inner science that has been of practical interest to researchers in cognitivism and neuroscience, offering significant contributions to the study of emotions in their field of knowledge. For instance, one of the main goals of Buddhist philosophy and the practice of Buddhism is to eliminate the noxious effects of negative and excessive emotions through techniques that have been developed for centuries. The contributions of the conference highlight how Oriental philosophy reaches the West in the form of psychology and studies on cognition. The book contains important reflections, new points of view and analogies for fundamental concepts, including that of identity. In Buddhist philosophy and practice, identity is articulated and conceived very differently than in Western thought. While the typical Westerner has been striving for centuries to build a more or less stable identity, the typical Buddhist strives to detach him or herself from any identity. This is because even if he/she could find the source from which identity arises, he/she should refrain from seeking it because identity itself is a flow of consciousness in continuous movement, thus binding oneself to a fixed idea of identity can only create mental affliction. For centuries, Buddhism has investigated ways to free the mind from the afflictions that generate automatic behavior dictated by destructive emotions. According to Buddhism, destructive emotions obfuscate the mind, by distorting any accurate perception of the surrounding environment. In order for the mind to have a keen perception of the surrounding environment, it must be liberated from these emotions, since they interfere with the very act of perceiving. In

this sense, neuroscientist Robert Livingston advances that everyone (in Western culture) seems to be reaching for some kind of steadiness and stability of the imaginary, but one should not to expect anything positive from this tendency. It seems that individually and collectively we seek something to hold on to—whether physical, mental or religious—but there is no guarantee about the results this attitude can obtain. One can never be completely sure because our experiences are so different from one another. Therefore, there can never be a common denominator for all of us. It is impossible to believe that we all can feel and perceive the same way, even regarding a similar situation.

What emerges from this cross-cultural dialogue is the sense that the West does not possess a clear model of mental health. Research in the West is oriented toward the study of mental pathologies, and mental health is defined by the absence of pathologies. In Buddhism, on the other hand, there exists clear and numerous criteria for mental and social wellbeing, as well as a series of practices one can undertake in order to achieve them. A comparison between Western science and Buddhist teachings can provide a more profound knowledge of how damaging emotions can emerge and how to deal with them, also in order to describe new models of mental health.

The collaboration between neuroscience and Buddhism also deserves special attention. Richard Davidson is professor of psychology and psychiatry at the University of Wisconsin at Madison, as well as founder and chair of the Center for Investigating Healthy Minds at the Waisman Center. He and his collaborators have used Tibetan monks as models of human neurophysiology and emotional response since 1992. Davidson is a staunch supporter of the plasticity of the brain, and has been subjecting meditation practitioners to tens of thousands of hours of brain scans. In his view, the empirical evidence points toward the fact that one can learn

happiness and compassion, just as one learns a skill like playing a musical instrument or a sport like tennis or golf. He utilised the latest technologies of fMRI and EEG/MEG imaging in the research of meditation, perception, emotion and the relations between human neural plasticity and meditation practices.

The bond between Buddhism and neuroscience is corroborated by findings on the issue of the self. New research in neuroscience has shown that our idea of having an indivisible self could be just a special neural configuration giving rise to the feeling of possessing a self, a topic that will be addressed more extensively in Chapter 4. Buddhist schools devote great attention to the topic of self. It is a complex issue that needs particular clarity as the Dalai Lama points out in this book *Gentle Bridges*, the publication that came of the Mind and Life conference held in 1987, published in 1992.

> I think clarification is needed for the Buddhist term "mere self". When we speak of mere self in Buddhist philosophy, this term mere self does not exclude any and all kinds of bases; it excludes only the inherent existence of the self. (1992: 232)

The book *Destructive Emotion* (2001) dedicated specifically to how Western and Eastern systems of knowledge can converge in order to remove human suffering stems from negative emotions. As the Dalai Lama explains in a conversation with Francisco Varela:

> So there is a very deep approach in Buddhist philosophy and practice to try to examine if that "I" is just an illusion, just a name we attach to that stream and flux in continuous transformation. We cannot find the "I" in any part of the body, or as something that would pervade the body in its entirety. We might think that it lies in the consciousness. But consciousness is also a stream in continuous transformation. The past thought is gone, the future one has not yet arisen. How can the present "I" truly exist, hanging between something that has passed and something else that has yet to arise? (...) And if the self cannot be identified in the mind or the body, nor in both together, nor as something distinct

> from them, it is evident that there is nothing we can point to that can justify our having such a strong feeling of "I". It is just a name one gives to a continuum, just as one can point to a river and call it Ganges or Mississippi. That's all. (2001:71)

In Varela's view, the Buddhist conception of the empty self relates well to models of the "virtual self" currently being developed by biology and cognitive sciences, as well by the philosophy of mind. Thus, in this view, the self can be considered as an emergent property through which the mind is able to interface with the world. Like the mind, the self has no substantial existence. It is somehow deterritorialised (Lévy 1995). Because it cannot be located anywhere, it is more likely to be a net of neural connections than "a thing" (2001:82). Eleanor Rosch, professor of cognitive psychology at the University of California in Berkeley, provided a Western point of view during the dialogue on the topic of the self within the context of psychology:

> What is, in fact, happening is that Western psychologists simply have no inkling of the importance of the self, let alone its nonexistence....Without access to one's own mind, one cannot begin to see the self referentially in all of one's processes—thoughts, emotions, everything—and without seeing that self-reference is there, one cannot begin to understand conceptually what is meant by saying that all that is not based on a real self. (1992: 231)

Another way to analyse the self is to conceive of its emergence as a quality that arises in the relationship with others. *The Birth of Intersubjectivity* (2014) is a book written by the psychoanalyst Massimo Ammaniti and neurobiologist Vittorio Gallese. Gallese is part of the group of scientists who discovered the existence of "mirror neurons", motor cells of the brain that are activated by observing movements performed by other individuals during the execution of targeted movements. He is interested in developing an interdisciplinary approach for the understanding of the embodied foundations of social cognition. The text is dedicated to the investigation of intersubjectivity, a conceptual construct that describes the continuous and

mutual intentions, present since the early days of life, through which humans come gradually to know the minds of others humans. The Other must not be seen only as a subjective representation from a third-person perspective, but as an embodied entity: intersubjectivity, can be considered as the possibility of "mapping the other onto oneself", a possibility enabled by "the mapping of oneself on the other" (2014:1). A reductive explanation according to which intersubjectivity is a simple function of cerebral circuits is not enough to explain the process. According to the authors, there is no supremacy of the brain over the body and other cognitive phenomena.
A key theme of the new approach of intersubjectivity is the study of the neural basis of our ability to be connected to the intentional relations of others:

> Through an intentional connection, or better, attunement, "the other" becomes more than just a different representation system: it becomes a self-body, like us. This new epistemological approach to intersubjectivity has the advantage of being able to formulate specific functional predictions on the intrinsic nature of our social cognitive tasks, overcoming, and not being subject to a specific ontology of the mind, such as that one favoured by the classical approach (2014:32).
>
> […] Both the self and the others seem to be intertwined because of the incorporeity that unites them. (2014:42).

This point of view reinforces the idea that to analyse any phenomena without seeing it as a built up relationship and process is no longer a sustainable view. The ideas about the nature of objects, space and time and the particular structuring of self-development within Buddhism are particularly significant, and there are numerous experimental confirmations within the neurophysiological and neuropsychological.

These studies open new and important approaches in the field of therapy and psychiatry in the treatment of mental disorders. The interest in

Buddhism by exponents of psychoanalytic thinking is not new and was manifested in the early decades of the twentieth century. Jung, for example, demonstrated his interest in the study of Buddhism during the lectures he held from 1933 to 1941 at the Eidgenössische Technische Hochschule in Zurich, and in his introductory essays to two Tibetan religious texts *The Tibetan Book of the Dead* (1935) and *The Tibetan Book of the Great Liberation* (1954), and the volume *Introduction to Zen Buddhism* by D.T. Suzuki (1939). Italian psychoanalysts like as Roberto Assagioli, founder of Psychosynthesis and Emilo Servadio, one of the founders of the Italian Psychoanalytic Society, also became interested in the use of Buddhist techniques of meditation in the practice of psychotherapy. Later, in the 1960s, the publication of the important essay *Zen Buddhism and Psychoanalysis* by E. Fromm, D.T. Suzuki and R. De Martino brought these issues once again to the fore. Recent times have witnessed a resurgence of interest in the encounter between psychoanalysis and Buddhism, thanks to authors like Mark Epstein, Anthony Molino, Barry Magid and Joseph Bobrow. In India, in the V B.C. in the Buddhist tradition, it was already possible to detect an accurate analysis of the human mind and its main mechanisms, which provided a rational model of control of an interior dimension similar to the Freudian psychoanalysis language would later call "libido". Despite the different levels of analysis and different objectives, many neuroscientists have become aware of the enormous richness of knowledge and psychological experiences that the Buddhist tradition has accumulated over the past two millennia.

Despite the surge of interest Buddhism is experiencing, as evidenced by its widespread diffusion among the Western general public and also the scientific community, there is no lack of those who try to dampen this enthusiasm. *Unmasking Buddhism* in a book written by Bernard Faure in 2009, a professor of Asian religions at Columbia University and Stanford

University. The author warns against the fact that, in the West, there is a tendency to identify Tibetan Buddhism as the only kind of existing Buddhism despite of a much more varied and complex tradition, depending on the various territories where the teachings of the Buddha have taken root in East and South Asia. In his opinion this tendency is encouraged by the Dalai Lama himself, who offers Tibetan Buddhism as a template for a sort of universal Buddhism, with the risk of losing its varied historical origins and complex traditions. Faure disputes the Westernisation of Buddhism, which tends to stress its rationalist aspects, while overshadowing a whole range of irrational practices having to do with faith, magic and rituals, which produce social behaviours more than they produce philosophical theories.

> By placing Buddhist thought within a philosophical context, we are making a choice which—however justifiable—has various consequences. For one thing, it implies an exclusion of the non-philosophical—which is judged to be less relevant in terms of understanding another culture or at least in evoking Western sympathy towards other cultures […] Although driven by different motivations, our distinct preference for a philosophical Buddhism links in with attempts by Asian elites to present a purified, "demythologized," and rational form of Buddhism—in short, a doctrine perfectly adapted to modernity. (Faure 2009:33)

The author believes that these dialogues have neglected to define the core principles of each side and their difference. His critique noted the tendency to emphasize Buddhism's compatibility with modern science, as well as the idea that scientific discoveries were anticipated long ago by Buddhism. However, as we have seen, the Dalai Lama himself is well aware that the dialogue between science and Buddhism has many irreconcilable points and that the dialogue has precisely the aim of revising Buddhist beliefs if they are irreconcilable with new findings, by virtue of the fact that Buddhism welcomes empiricism. In his article "A Gray Matter: Another Look at Buddhism and Neuroscience" (2012), Bernard Faure focuses on

neuroscience, a science that promises to reveal not only how the brain functions but also considers the mind a legitimate object of research. What Faure contests is the decontextualisation of meditative practices from his soteriological roots in order to create a false idea in the West that those meditative practices belong to all the Buddhist schools.

Neuroscience tries to utilize evidence on how the brain of meditating Buddhist monks have shown change in cognitive function and neural activity to support the neuroplasticity of the brain:

> But any activity performed consistently—whether playing the piano or riding a bicycle, or reading magazines—can significantly alter one's state of mental functioning. (2016:73)
>
> You can measure anything you like, of course, but solid experimental data cannot simply be the results of new scanning techniques; they must be a response to well-asked questions that justify specific measurements.(2016:75)

He insists that we need to rediscover the meaning of meditation in the context of the Buddhist tradition which has, as its main objective, the liberation from evil, while neuroscientists try to understand the neural correlates to artificially reproduce them:

> While the financial benefits of this could prove immense, Buddhism would, in this case, be reduced to another variety of neuro-enhancement of the same type as those advertised by pharmaceutical companies. (2016:111)

Faure fears that the research of faith-based neuroscientists which asserts that every mental activity has a neural correlation, including awareness, may prove illusory. The Dalai Lama himself is in fact in disagreement with neuroscientists on this subject: the enlightened states cannot be explained only on a physical plane of neural correlates. In this context, however, I wanted to highlight how the dialogue between science, traditionally a bearer of objective values and Buddhism, a bearer of subjective values has involved many scientists, beyond whether this dialogue can be effective or

not. We need to point out that this dialogue between science and Buddhism is emblematic of a need to recreate a bond between subject and object which has been torn and fragmented, a necessity born at the moment when the consciousness of the observer becomes crucial to explain scientific reality just as artistic vision.

## 4. A Delicate Empiricism

The effects of the split between scientific culture and humanistic culture have long resonated throughout Western culture. C.P. Snow, the British scientist and novelist, gave a classic presentation of the problem in his famous 1959 lecture "The Two Cultures". The lecture was published in the same year in the book *The Two Cultures and the Scientific Revolution.* It is first of all a critique of Victorian school systems, which in his view had given disproportionate attention to Latin and Greek at the expense of scientific education, in spite of the crucial importance of superiority in science and technology for the Allies' victory in the Second World War. This was an explicit statement in favour of a hierarchy in knowledge unheard of in previous historical eras, when humanistic and scientific cultures complemented each other. However, the key idea was that Snow strongly felt that the split between the two forms of human knowledge had to be recovered, that an exchange of ideas and concepts between the two cultures was needed in order to recreate an integrated global cultural community.

Snow's lecture expresses a concern similar to Varela's, who sees the excessive abstractionism of modern science as breaking away from common sense and creating a parallel scientific culture that does not relate to the needs of individuals. Echoes of Snow's unachieved call for re-integrating natural and social science can be found in *The Third Culture: Beyond the Scientific Revolution* (1995), edited by agent, entrepreneur and thinker John Brockman, who later created the Edge Foundation, which is devoted to discussions between top researchers coming from different disciplines on emerging scientific issues. Following Snow's idea, the work aims to involve scientists in the first person and this has profound philosophical implications that also extend to social, economic and political spheres.

The relationship between art and science is a landscape in chiaroscuro. Plato considered art not only devoid of theoretical foundation, but also a misleading representation of reality based on the subjective emotions of the painter or poet. On the contrary, the Renaissance was a moment of perfect symbiosis between art and science, personified by the polymaths of the age, of whom Leonardo da Vinci is perhaps the best exponent. With the Enlightenment in the eighteenth century, art was eclipsed again by the idea that specialisation was the only possible way to reach knowledge, so that art was relegated to the sphere of extreme subjectivism, reaching its peak in the nineteenth century with the Romantics' reaction to the rationalism of the previous age. The dispute between Goethe and Newton about colour theory is an extreme case study of the relationship between art and science. This dispute is still relevant today in terms of the philosophical and methodological implications it had for both disciplines. In *Arte come Scienza (1989)*, an Italian translation of the original *Wissenschaft als Kunst* (1984), there are important contributions to this debate by authors such as Heinrich O. Proskauer, Victor Georgé and Paul Feyerabend. Goethe wrote his *Theory of Colours* in 1810 to contrast the studies conducted on the same subject by Sir Isaac Newton, which he developed in his *Opticks* of 1704. Goethe's case is not critical because it applies an artistic practice to the new scientific discoveries of the time, but rather it is an application of a method able to fully include the first-person perspective within the observation of nature. It is a perfect case of the ways in which an "artistic/subjective" approach has been better able to bring to the world scientific "objective" knowledge. Furthermore Goethe's method is a holistic approach in contrast to the selective and partial approach of the sciences.

The approach of Sir Isaac Newton (1642–1727) was to consider light as something mechanical and therefore quantifiable and a measurable phenomenon. Consequently, colour was supposed to be a physical object that existed independent of human perception. The demonstration of this

theory was deduced by making light pass through a narrow space and from there to a prism, in which the entire spectrum of colours was produced, and each colour could thus have its own specific measurement. Newton hypothesised that light was made of *particles* of different colours, and that the different colours of light moved at different speeds in transparent matter (the prism), with red light moving faster in glass than violet light, for instance. Newton uses the scientific method, namely to deduce a hypothesis, an abstract concept, from an observed phenomenon and hence create a mathematical model of quantitative measurement of that empirical finding.

In this model, one can recognise the traditional scientific model in which information flows from the observed system to the observer. A model that, has been overturned by the second wave of cybernetics, in which information flows from the observed system *through* the observer, making him/her part of it (Hayles 1999:11). Goethe thought in different terms than Newton. Writing a century later when Romanticism was in full bloom, Goethe argued that colour was not solely a physical phenomenon, existing only as a measurable property of light. He argued that the continuous spectrum was a compound phenomenon. Where Newton narrowed the beam of light to isolate the phenomenon, Goethe observed that a wider aperture produces not a spectrum, but rather reddish-yellow and blue-cyan edges with white between them. As he concludes, the colour spectrum is not the splitting of light but the convergence of lightness and darkness, so that the spectrum appears only when their edges are close enough to overlap. There is no *experimentum crucis* for Goethe's theory of colours, Goethe claimed that the experience of the man who observes nature should be the starting point of all knowledge, replacing with this approach the scientific method, as it is traditionally understood, which applies abstract theories to natural phenomena. Supporters of the Newtonian view argued that Goethe did not apply mathematics in his theory of colours. He answered this charge by

claiming that even mathematics needs to have received something from the senses before it can be applied to the reality of appearances:

> Because the mathematician, turns his gaze only to what is quantifiable in the world at the risk of shaping the world for his own head. (Goethe 1810, quoted in Feyerabend 1984: 74)

In his essay "La science en tant qu'art" (science as art) Paul Feyerabend shows how qualitative knowledge came to be neglected with Galileo and the birth of the mechanistic-quantitative view of natural science. Conversely, Goethe considers that modern science observes nature under artificial conditions and only with the mediation of instruments. He was rather interested in observing nature with "an unarmed eye" because nature falls silent when it "undergoes torture" (1810 [1979]). Thus, he proposes to adopting "a delicate empiricism" that identified with the object (1810 [1979]) in the most intimate way, a vision according to which nature and the knowledge of oneself must have mutual influences. In this sense, Goethe proposes that to speak about colours without including the one who sees them doesn't make sense. Therefore, the division between subject and object, so important for science, doesn't exist for Goethe: for him nature was not foreign—nor could it only be known through abstract concepts. Rather, he seems to feel one and the same with the nature. The conclusion is that while Newton's studies became important for the purpose of knowing colours from a physical point of view, Goethe not only corrects Newton's false assumptions about refrangibility, but his theory embraces all chromatic phenomena, and includes the observing subject in it. In this respect, in another essay Feyerabend arrives at the conclusion that for Goethe:

> it was not a comparison between a *mathematical* concept and a *qualitative* one since the opposition quantitative analytical and qualitative global plays even within pure mathematics itself an important role and should not be underestimated. (1984 [1989]: 114)

To this day, it would seem that the analysis of colours can once again be a reason for a fruitful exchange between art and science, particularly within the context of neuroscience. Thomas Metzinger is a philosopher who promotes consciousness studies as an academic endeavour. He cooperates closely with neuroscientists in order to solve philosophical problems about the nature of the mind and of the self. In his book *The Ego Tunnel* he convincingly explains that there is no such thing as a "self". To support the idea that there exists a real world without any shadow of doubt, regardless of our mind, he uses the example of colours:

> The conscious brain is a biological machine—a reality engine—that purports to tell us what exists and what doesn't. It is unsettling to discover that there are no colours out there in front of your eyes. The apricot pink of the setting sun is not a property of the evening sky; it is a property of the internal *model* of the evening sky, a model created by your brain. The evening sky is colourless. The world is not inhabited by coloured objects at all. (2009:20)

Goethe's shift in importance from an absolute objectivity to a *delicate empiricism* emphasises the relationship between the subject and the outside world, i.e. objectivity, rather than conceiving the two as distinct realities.

The 1986 Venice Biennale was dedicated to the relationship between art and science. In an essay written by for the catalogue, Maurizio Calvesi shows how the evolution of the notion of perspective in art has evolved throughout history and how it is intimately related to evolving scientific conceptions of space. In his classic art historical essay "Perspective as Symbolic Form" (1927), Erwin Panofsky teaches us how perspective is not just an application of the rules of geometry, but is rather a symbolic shape informed by the notion of space at a certain historical/cultural moment. Reprising Panofsky's insight, Maurizio Calvesi argues that after Leon Battista Alberti systematised Filippo Brunelleschi's invention of the perspective (1416) in his book *De Pictura* (1434-1436), the new approach to artistic representation suffered a first trauma with the diffusion of Copernican

cosmology (1543), which led to Giordano Bruno's immanent view of the universe (1548-1600). Copernicus' heliocentric model of planetary motion, implied an infinite and polycentric universe. A vision that displaced a hitherto fixed Earth from the centre of the universe, consolidated by the revolutionary experiments and observations of Galileo Galilei (1564-1642). By embracing heliocentrism and jettisoning geocentrism, humankind lost the illusion of being at the centre of the universe, with psychological and epistemological consequences. Calvesi noticed how Francesco Borromini S*calone di Palazzo Barberini* and in *Cupola di San Carlo alle Quattro Fontane* in Rome applied this new conception of space, and how the use of the perspective also alludes and conveys the moral values of that time:

> The perspective does not drive the vision anymore, instead it misleads it. In the famous tunnel perspective of Borromini, the principal idea was to provoke a reflection of a moral nature upon the shallowness and vanity of worldly things, which appear greater than they are. (Maurizio Calvesi 1986: 32)

In fact, Borromini's use of perspective was not designed to reproduce reality but to show how humankind, through the use of its instruments, technical and mental, is capable, of fooling the viewer's eye. Borromini applied his typical device—known as the fake perspective—by interlocking geometrical configurations for constructing plans. The resulting effect is that the interior lower walls appear to weave in and out by making different points of view converge in a unique one. After the great revolution produced by Galileo and Newton, as Calvesi shows, a second huge epistemic break comes about when Einstein introduces the idea that space and time cannot be considered separately and this new revolution affected the work of Cubism and Dadaism, artistic movements that explored the fourth dimension of reality.

In the artistic field, even if there is no evidence that the major artists of the time entered directly in contact with Einstein's theory of relativity, it is undeniable that Cubism, for example, provides multiple and simultaneous point of views in unique images opened to a multi-universal vision so

difficult for humans to grasp. It was a great moment of contact between scientific and artistic development. De Chirico used the classic perspective to mystify the space with a unique centre. Splitting the vanishing point and subtly alternating the linear projections, De Chirico produces his metaphysical space which seemingly has the fixedness, the transcendence and the regularity of classic space but instead of certainties it communicates cryptical uncertainties, proper of a reality where indetermination rules. Within the context of the Dada movement, Marcel Duchamp explicitly declared in *Entretiens* with Pierre Cabanne (quoted in Claire 1975 [2003]: 25) that the fourth dimension, and especially by the book by Gaston de Pawlawski *Voyage au Pays de la Quatrième Dimension* (1912), greatly influenced the development of his work *Gran Verre* (1915-1923). With Maurits Cornelis Escher (1898-1972) we witness the importance of the role of the observer in art. Inside the illusion space, the artist creates a place between him and the artistic object within which the observer has to localise the point of view, which gives him key to read the image. Escher's art is just a reflection of the important studies conducted by cognitive psychologists who have questioned the idea of pure observation, objective observation. During the 1950's psychologists began to push the idea that perception is an active process. The eye and the brain are not simply taking photographs of an outside reality, but they influence in some way what seems to exist outside.

Art is not simply a place for disseminating scientific knowledge, but a valuable and immediate cognitive tool that allows us to understand the limits and potentials of visual perception, as well as the changes to which it is subject according to the conceptual assumptions that we have about the world. Art and science nourish and inspire each other the entire time.

Just as the use of perspective, and any representational system, offers a privileged point of view on the world, at the expense of many others, there are also other possible scientific theories that interpret the world and offer a

reading of it according to certain perspectives and points of view. After all, the central issue is to no longer conceive the subject at the centre of the universe and nature, but rather to bring it back into nature to emphasise the subject's relationship with it. This urgent conception is necessary to penetrate the realm of common sense in order to bring us back to assert an ecological vision well-grounded in solid philosophical roots. If the Cartesian moment invoked the victory of science and philosophy over any other branch of knowledge, today, there are solid arguments that favour a rehabilitation of subjective knowledge and of the role of creativity in the cognitive process. The example of the dispute between Newton and Goethe is an excellent antecedent to suggest that a coexistence between subjective observation, of which asceticism represents the maximum expression, and the **"**objective**",** one corresponding to science, is not only possible but can also produce a kind of knowledge that is better integrated with human needs. Another hypothesis I am advancing is that art, particularly contemporary art, has a role in Western thought which is equivalent to that of meditation in Eastern thought. If meditation, with all its different practices and techniques, has the development of consciousness as its goal, art also provides a vast range of occasions to enlarge our consciousness. But consciousness is a really controversial concept, more so than nature is, so before exploring the contribution that art can have for a reconciliation between observer and reality, delving into the subject of consciousness seems necessary.

## 5. Consciousness: When Pattern Gives Meaning.

In this chapter, I will try to elucidate some notions and problems related to an extremely complex—some would say unsolvable—issue: consciousness. With the advent of the scientific revolution the brain and the mind became objects of empirical observation although a scientific theory of consciousness is still missing. This common interest brought about in the last decade became a fruitful collaboration between the two disciplines, so that the mind is no longer discussed solely in the philosophical or psychological contexts. In fact, thanks to new digital imaging technologies neuroscientists are making a major efforts to provide a scientific explanation for a phenomenon that is intrinsically subjective, primarily first person, while any scientific observation of consciousness must be done in the third person. My approach provides an overview of philosophers who have best engaged the topic, then outlines how neuroscientists have approached the problem of consciousness, and finally concludes with the meaning consciousness has in Buddhism, where it is a core concept in terms of philosophical thought and religious practice.

In what follows, I explore how this fundamental human quality arises under certain circumstances from a sort of information disposition, which I will call pattern. The way the pattern came to be configured gives rise to a certain meaning, which I term consciousness. David J. Chalmers is an Australian philosopher who specialises in philosophy of the mind and the philosophy of language. His book *The Conscious Mind* (1996) is widely considered to be an essential work on consciousness. Chalmers' theorizing starts from the belief that consciousness, like all other natural phenomena, are subject to fundamental natural laws, but this doesn't imply that consciousness works like exactly any other natural occurrence:

> In the most common conception of nature, the natural world is the physical world. But in the most common conception of

> consciousness, it is not easy to see how it could be part of the physical world. So it seems that to find a place for consciousness within the natural order, we must either revise our conception of consciousness, or revise our conception of nature. (Chalmers 1996:1)

The author makes an interesting distinction between the "easy" and the "hard" problems of consciousness. The "easy problem" would search for an answer to questions such as: how does the brain process environmental stimulations? How does it integrate information? How do we subjects produce reports on internal states? The "hard problem", in turn, seeks answers to questions like: why is all this processing accompanied by an experienced inner life? The hard problem of consciousness is the problem of explaining how and why we have qualia or phenomenal experiences—how sensations acquire characteristics, such as colour and taste. Chalmers affirms that the scientific study of consciousness leaves the hardest problems about consciousness unresolved. Easy problems address studies of the mind in general, and are concerned with the structure of the brain and how it functions based on physical explanations. Furthermore, cognitive science deals with the explanation of behaviour, relating it to mental states, which may or may not be conscious. The easy problem is related to a specific concept of the mind in which the studies are considered from a psychological point of view. Hard problems require another kind of explanation because physical structure and function do not suffice to explain consciousness. The hard problem of consciousness is the problem of subjective experience. It implies a point of view that includes the *phenomenal* concept of the mind characterised by the way one *feels*. Chalmers detects an epistemic gap in "*Consciousness and its Place in Nature"* between the physical and phenomenal domains. To search for correlations between areas in the brain and conscious states have been the main methodology in the search for a conscious explanation but he refuses any materialist argument for it. In his conception, there are no doubts:

physical, chemical and biological phenomena are not enough to explain consciousness. In this respect, Chalmers states:

> There is no question that experience is closely associated with physical processes in systems such as brains. It seems that physical processes give rise to experience, at least in the sense that producing a physical system (such as a brain) with the right physical properties inevitably yields corresponding states of experience. But how and why do physical processes give rise to experience? (2002: 3)

And then:

> What is mysterious is why consciousness state should *feel* like something... (1996:14).

In this simple sentence Chalmers introduces the idea that states of consciousness need correspondence between elements, as suggested by the well-known expression "feels like". Even if physical processes can't offer an explanation about consciousness he insists that there may be a law, which he deems a *"psychophysical law"* that determines which physical systems are associated with which types of qualia, namely, the qualitative subjective aspect of the mind. In this sense, for Chalmers these fundamental principles must link physical with phenomenological properties. Chalmers himself admits that he has no solution for the problem of consciousness. However, he tries to offer some intuitive solutions, identifying three different kinds of dualism: *interactionism, epiphenomenalism* and *panprotopsychism*.

He defines them as follows:

> 1*) Interactionism*: physical states will cause phenomenal states, and phenomenal states cause physical states. (2002: 29)
>
> 2) *Epiphenomenalism* holds that phenomenal properties are ontologically distinct from physical properties, and that the phenomenal has no effect on the physical. Physical states cause phenomenal states, but not vice versa. (2002: 32)

> 3) *Panprotopsychism* is the view that consciousness is constituted by the intrinsic properties of fundamental physical entities: by the categorical bases of fundamental physical dispositions. On this view, phenomenal or protophenomenal properties are located at the fundamental level of physical reality, and in a certain sense, underlie physical reality itself. Where we have relations and dispositions, we expect some underlying intrinsic properties that ground the dispositions. The view acknowledges phenomenal or protophenomenal properties as ontologically fundamental, and it retains an underlying duality between structural and dispositional properties (those directly characterized in physical). (2002: 35)

I found the last *Panprotopsychism* interpretation intuitively appealing and I will linger on it, not only because it gives me the opportunity to compare this theory with the thought of another author, Thomas Mezinger, but especially because the idea of consciousness bound by relations and dispositions is coherent with one of the core ideas of this thesis about the importance of interdependence; in particular, the relation between the observer and observed reality, which is a crucial question both in quantum physics and Buddhism. Furthermore, the idea that certain *dispositions* occur when consciousness is at work seems important to me in relation to art. In this sense, I understand art as a generator of new patterns, both at the physical and mental levels. Chalmers attempts to find general laws to explain his hypothesis of consciousness as characterised by a duality between structural-dispositional properties and what he calls "panprotopsychism", the view that fundamental physical entities are protoconscious. Panprotopsychism is a view derived from the philosophical theory of panpsychism.[1] A natural intuition is when experience arises from a physical system. It does so in virtue of the system's *functional organization,*

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[1] Panpsychism can also be seen in ancient philosophies such as Stoicism, Vedanta and Mahayana Buddhism. During the nineteenth century, panpsychism was the default theory in the philosophy of mind, but it saw a decline during the middle years of the twentieth century with the rise of logical positivism. The recent interest in the hard problem of consciousness has once again made panpsychism a widespread theory". From https://en.wikipedia.org/wiki/Panpsychism

so for Chalmers it is possible that wherever information is being processed, consciousness may arise. He thus describes this hypothesis:

> This principle deals with the notion of information not at a semantic level but rather on a formal or syntactic level: information as a state selected from an ensemble of possibilities. (1996: 261)

He clarifies the concept of an *information space* from which this selected state of information is generated:

> An abstract space consisting of a number of states, which I will call *information states*, and a basic structure of *difference relations* between those states. The simplest non-trivial information space is the space consisting of two states, with a primitive difference between them. We can think of these states as the two "bits", 0 and 1. The fact that these two states are different from each other exhausts their nature. That is, this in formation space is fully characterised by its *difference structure*. (1996: 262)

Chalmers sustains that information can found both in the physical and phenomenal worlds, since one does not exclude the other:

> As I have defined them, information spaces are *abstract* spaces, and information states are abstract states. They are not part of the concrete physical or phenomenal world. But we can find information in both the physical and the phenomenal world, if we look at things the right way. To do this, we need to discuss the various ways in which information spaces and states can be *realized* in the world. (1996:264)

Chalmers is looking for a possible law that relates the organization of information and experience:

> In general, an information space associated with a physical object will always be defined with respect to a *causal pathway* (for example, the pathway from the light-switch to the light) and a space of possible *effects* at the end of the pathway (in this case, the on/off state of the light). Physical states will

> correspond to information states according to their effects on the causal pathway (1996:264).
>
> When two physical states have the same effect on the pathway —as with two positions of the light switch both of which lead to the light being on—they will correspond to the same information state. If we carve up physical states in this way, we will arrive at a basic set of physical differences that make a difference, making up the physical realisation of an information space (1996:265).
>
> We can also find information realised in our *phenomenology*. States of experience fall directly into information spaces in a natural way. There are natural patterns of similarity and difference between phenomenal states, and these patterns yield the difference structure of an information space. Thus we can see phenomenal states as realising information states within those spaces (1996:266).

Then, to better clarify this principle, he explains how the informational spaces could be fit to be applied to the experience of consciousness. Chalmers admits that a theory based on panpsychism could appear too crazy for Western thinking, since it assumes that every system might be conscious at some level.

> Consciousness might be universal. The idea is not that photons are intelligent or able of thinking, or that they can feel angst. Rather, it's that Photons have some element of raw subjective feeling, a precursor to consciousness. […] This might seem crazy to us but not to people from other cultures. Then, another simple way to link consciousness to fundamental laws may be to link consciousness to information processing. Chalmers assumes as possible that in any dimension in which there is a kind of information processing there might be consciousness (2014).

Within the context of this research, I will focus on the idea that consciousness arises from the special way in which information organises itself. Currently, the advancement of studies on the mind and its new findings require interdisciplinarity between philosophers and neuroscientists. The study of consciousness can be a fecund encounter

between East and West, between Western science and Oriental philosophy. Thomas Metzinger is one of the philosophers of the mind who works closely with neuroscientists. Like Chalmers, Metzinger affirms that *phenomenology* has long been neglected in the scientific study of the mind, i.e. the fine-grained and careful description of inner experience as such. His book the *Ego Tunnel* intends to break from the myth of the self as central and independent from reality, and tries to grasp what consciousness truly is. With this aim, he adopts an interdisciplinary approach, which includes topics that are taboo in academic studies such as altered states of consciousness (i.e. meditation, lucid dreaming or out-of- body experiences) and psychiatric syndromes. Metzinger uses the metaphor of the Ego Tunnel to assert that what we consider reality is not reality in itself, but only a model through which we perceive it:

> What we see and hear, or what we feel and smell and taste, is only a small fraction of what actually exists out there. Our conscious model of reality is a low dimensional projection of the inconceivably richer physical reality surrounding and sustaining us. Our sensory organs are limited: therefore, the ongoing process of conscious experience is not so much an image of reality but rather a tunnel *through* reality. (2009: 6)

For Metzinger, the tunnel through which we enter into contact with reality is transparent, we are unable to perceive ourselves as models, as instruments, which is actually the only way in which we should perceive reality. In this sense, what we consider "reality" is, in fact, "what our senses present to us," which function as a kind of filter for "reality", which we can never enter into direct contact with it. (2009: 9).

However, Metzinger considers conscious experience not as merely physical experience and biological processes, but also implies that the living being has gained awareness of its own existence, it creates inwardness. In this respect, the important insight seems to be the notion of integration:

> Consciousness is what binds things together into a comprehensive, simultaneous whole. If we have this whole, then a world appears to us. If the information flow from your sensory organs is unified, you experience the world. If your senses come apart, you lose consciousness. (2009: 26)

Thus, consciousness is a very special form of *information processing* that integrates all the data from our interaction with the world. Metzinger therefore proposes to investigate consciousness through individuals practicing deep meditation experiences, given that in these kinds of practices "integration is particularly salient" (2009:32) He refers to the studies Antoine Lutz and his colleagues at the W. M. Keck Laboratory for Functional Brain Imaging and Behavior at the University of Wisconsin made by studying Tibetan monks, who had carried out about ten thousand hours of meditation. Researchers studied their brains with modern neuroimaging techniques. The results reported by Metzinger stated that:

> The high amplitude gamma activity found in some of these meditators seems to be the strongest reported in the scientific literature. Meditators self-induce sustained high-amplitude gamma-band oscillations and global phase-synchrony, visible in EEG recordings made while they are meditating. The gamma-band oscillations, caused by groups of neurons firing away in synchrony about forty times per second, are one of our best current candidates for creating unity and wholeness (although their specific role in this respect is still very much debated). For example, on the level of conscious object perception, these synchronous oscillations often seem to be what makes an object's various features—the edges, colour and surface texture of, say, an apple—cohere as a single unified percept. Many experiments have shown that synchronous firing may be exactly what differentiates an assembly of neurons that gains access to consciousness from one that also fires away but in an uncoordinated manner and thus does not. (2009:32)

A further element that is worth presenting in this context relates to Chalmer's functional isomorphism. These structural correspondences, the functional isomorphism, must occur synchronically. One of the most fascinating hypotheses about the nature of the consciousness is the one

advanced by Roger Penrose, an English mathematical physicist and philosopher of science. In his book *The Emperor's New Mind (1989),* which makes detailed scientific explanations, persuades us to abandon any attempt to associate human thought and consciousness within a computing operation, however complex it may be, by using the binary logic of computers. The book strongly criticizes Artificial Intelligence (AI), which contends that human thought can be simulated algorithmically. "Algorithms, in themselves, never ascertain truth!", (1989: 533) he says. Truth for Penrose is also associated with certain qualities of human consciousness, such as understanding, judgment and meaning, properties that cannot be obtained by a computing algorithm running on a Turing machine, because these are qualities that are not encapsulated in the grammar of information science. By asserting that consciousness is not a special form of organized information that can be replicated by a computer algorithm, Penrose doesn't mean to give up on the possibility of simulating consciousness at all. Consciousness simply doesn't belong to the domain of mathematics and calculation. According to him, only when a new physical law capable of merging Schroedinger's quantum world with Einstein's general relativity appears, simulation of the mind will be possible; he calls such theory "quantum gravity" (1989). Quantum gravity will include simultaneity and randomness, concepts which are foreign to relativity but familiar to quantum mechanics.

With his studies and speculations, Penrose establishes a parallel between the properties that regulate consciousness and quantum physics, the finer and mysterious reality that humans are still puzzling about how to interpret, and expresses the conviction that consciousness is a special class of physical phenomena. The ways in which quantum gravity may fit with the functions of the brain is better and deeply explained in "Consciousness in the Universe: A Review of the 'Orch OR' Theory", an article co-authored with

Stuart Hameroff, which was published in the scientific journal *Physics of Life Reviews* in 2014. This article was also able to respond to the criticisms raised after the release of the book *The Emperor's New Mind (1989),* taking into account discoveries made after 1989, which were able to confirm Penrose's intuition about the quantum consciousness nature.
Penrose and Hameroff proposed the Orchestrated Objective Reduction (Orch OR), a theory based on the intuition that consciousness is a biological process that originates at quantum level, in collections of microtubules within brain neurons, a theory that asserts that this biomolecular processes is also at base of the structure of the universe. It looks like they refer to a kind of orchestrated symphony through which synapses organize themselves, generating a consciousness state thanks to the vibrations of microtubules. Penrose's speculations stems from the observation that quantum measurement is something that occurs only as a result of the conscious intervention of an observer, and that every measurement of such kind must include values such as randomness, simultaneity and uncertainty.

Thus, analysing the function of the brain, he takes in consideration that when a neuron "fires", it emits a whole sequence of such pulses in quick succession, this sequence will not give the same result, even if the same stimulus is activated by the same pulse, which suggests that there is also a probabilistic aspect of neuron firing and consequently in the formation of the sequence.

> Unlike the very precise wiring of an electronic computer, there would appear to be a good deal of randomness, uncertainty and redundancy in the detailed way in which neurons are actually connected up. (1989: 511)

Another characteristic feature of conscious thought is its "oneness", as opposed to a great many independent activities going on at once as normal computer acts.

> On the other hand, it seems to me that there could conceivably be some relation between this "oneness" of consciousness and

> quantum parallelism. Recall that, according to quantum theory, different alternatives at the quantum level are allowed to coexist in linear superposition! Thus, a single quantum state could in principle consist of a large number of different activities, all occurring simultaneously. (1989: 515)

To give a clear example of what he meant by "oneness" he refers to an artist who can keep the totality of his creation in mind all at once.
For example Mozart, as quoted in Hadamard (1945:16), describes how his particularly relaxed melodies appear in his mind:

> Then my mind seizes it as a glance of my eye a beautiful picture or a handsome youth. It does not come to me successively, with various parts worked out in detail, as they will later on, but in its entirety that my imagination lets me hear it. (Hadamard quoted in Penrose: 547)

For Penrose the sentence "mind seizes it as a glance […] "It does not come to me successively" has a special meaning, when he want to demonstrate that consciousness, as quantum process, have a special relationship with the concept of space-time. I find it interesting that Penrose uses Mozart to give a clear explanation of what consciousness means to him, and remarkable the way in which he relates consciousness to creativity, as a kind of generator of new thought structures, a concept very pertinent to this thesis, as I will further explore in the next chapter. Another feature of the brain that contrasts with computers is neuroplasticity, the brain's ability to physically modify itself. The interconnections between neurons are in fact not fixed, as they would be in a computer processor, but are changing all the time. Penrose tries to provide an explanation for neuroplasticity by referring to the geometry of quasicrystals. Quasicrystals are special arrangements of atoms that violate a standard mathematical theorem concerning the crystal grid, by displaying twofold, threefold, fourfold and sixfold symmetry patterns when they are rotated. A fivefold symmetry creates an incomplete pattern, because the operation of translating and rotating is not enough to close a shape in terms of occupying the entire surface. Despite their pattern incompleteness, Penrose argues that some of these quasi-crystalline substances are highly organized:

> The way that I picture this growth as taking place is that, instead of having atoms coming individually and attaching themselves at a continually moving growth line (classical crystal growth), one must consider an evolving quantum linear superposition of many different alternative arrangements of attaching atoms. Indeed, this is what quantum mechanics tells us must (almost always) be occurring! There is not just one thing that happens; many alternative atomic arrangements must coexist in complex linear superposition. A few of these superposed alternatives will grow to very much bigger conglomerations and, at a certain point, the difference between the gravitational fields of some of the alternatives will reach the one-graviton level. (565)

This thesis follows Penrose's idea that consciousness arises from an organization of elements in non-local patterns that cannot be completely predicted by binary logic and linear time, keeping in mind that a quantum computer might one day be able to process consciousness. Another perspective is provided by Antonio Damasio, a highly respected neurologist, who, thanks to his clinical practice and the ability to disseminate his findings in popular books, argues that neuroscience is discovering how the brain works. His position is interesting to consider, because it stands in opposition to Chalmers: for Damasio, as for Penrose, consciousness has a physical substrate. His method of inquiry is to advance theoretical hypotheses as suggested and supported by clinical and anatomical evidence. Damasio starts from the fundamental assumption that neuroscience has overlooked the important relation between the brain and the body or *soma*, including emotional processes. In the book *Descartes' Error: Emotion, Reason and the Human Brain* (1994) he explicitly rules out classical Cartesian dualism. With the *somatic marker* hypothesis, he proposes the idea that emotions work as a mechanism fundamentally guided by behaviour and decision-making, asserting that a separation of mind and body, rational and emotional does not exist.

> If there had been no body, there would have been no brain. (1994: 90)

This simple statement, however, doesn't necessarily imply that wherever there is a brain there is a mind:

> Brains can have many intervening steps in the circuits mediating between stimulus and response, and still have no mind, if they do not meet an essential condition: the ability to display images internally and to order those images in a process called thought. (The images are not solely visual, there are also "sound images", "olfactory images", and so on). (....) Herein lies the centre of neurobiology as I see it: the process whereby neural representation, which consists of biological modifications created by learning in a neuron circuit, became images in our minds; the process allows for invisible micro structural changes in neural circuits to became neural representation, which in turn became an images we each experience as belonging to us. (1994:89)

In the recent book *The Feeling of What Happens* (1999) he once again sets the problem of consciousness against the background of a neurobiological theory of emotions and feelings rooted in the body. First of all, he clarifies that a distinction between emotions and feelings must be made. For neuroscience, emotions are more or less the complex reactions of the body to certain stimuli. While emotional reactions occur automatically and unconsciously, feelings occur after we become aware of such physical changes in our brain. He advances the theory that three layered levels of consciousness exist: protoself, core consciousness and extended consciousness. Put in another way, consciousness follows three steps: emotion, feeling and feeling a feeling, i.e. a hierarchy of stages where each stage builds upon the previous one. Damasio states that he could identify the need to define something like the "self" to be able to explain the feeling of emotion, that is to say that where there is emotion there is a self. The point of departure of this process is what the author calls the "protoself", which is not a conscious state but "the most basic level of awareness", and whose

function is to be constantly aware of the state of the organism to maintain homeostasis:

> In this state, emotion begins to manifest itself as second-order neural patterns located in subcortical areas of the brain. Emotion acts as a neural object, from which a physical reaction can be drawn. This reaction causes the organism to become aware of the changes which are affecting it. (199:98)

Accordingly, it is stated that:

> feeling an emotion consists of having mental images arising from neural patterns which represent the changes in body and brain that make up an emotion and that this requires second-order representations necessary for core consciousness (1999:280).

Damasio clarifies what an "object" means to him in this context:

> By "*object" I* mean entities as diverse as a person, a place, a melody, a toothache, a state of bliss; by *image* I mean a mental pattern in any of the sensory modalities, i.e. a sound image, a tactile image, the image of a state of well-being (1999: 9).

The central idea of the book is that "core consciousness" is a second-order state of the mind/brain located in some specific regions, which is capable of representing the relation between representations of objects and representations of the soma. The author suggests that the "absence of emotion is a reliable correlate of defective core consciousness". (1999: 100) The basic subcortical structures responsible for emotions seem to be necessary but not sufficient for it: consciousness would also be necessary. Thus, both emotions and core consciousness require the same neural substrates, and that strategically placed dysfunction compromises both kinds of processing (100). Put simply, consciousness is the feeling of knowing a feeling, and is thus self-awareness. When the organism becomes aware of the feeling that its bodily state (protoself) is being affected by its experiences, core consciousness arises. Core consciousness is concerned only with the present moment, the here and now. When consciousness

moves beyond the here and now, Damasio's third and final layer comes into play: extended consciousness. This level could not exist without its predecessors, and, unlike them, requires the vast use of conventional memory.

In this context, a feeling is defined in *Descartes' Error*, as:

> The realization of a nexus between an object (entities as diverse as a person, a place, a melody, a toothache, a state of bliss) and an emotional body state (1994:132).

And consciousness is the unified mental pattern that brings together the object and the self:

> In essence those neural representations must be correlated with those which, moment by moment, constitute the neural basis for the self. The self is not the infamous homunculus, a little person inside our brain perceiving and thinking about the images the brain forms. It is rather a perpetually re-created neurobiological state. (1994: 106)

If Damasio gives to the self the essential element for every further conscious process, a neurobiological base is also relevant to see how those processes are re-created from an infinite range of possibilities thanks to which the neural patterns organise themselves in dispositional representation to create moment by moment:

> What I am calling dispositional representation is a dormant firing potentiality which comes to life when neurons fire, with a particular pattern, at certain rates, for a certain amount of time, and toward a particular target which happens to be another ensemble of neurons. (1994: 103)

"There is something that is playing in my head", is a phrase found in *Gentle Bridges* (1992) one of those books drawn from dialogues between Dalai Lama and Western scientists which occurred during the Mind and Life symposia.

> During Buddhist training, when you study the Mādhyamaka school, first you hear that things have not their own or intrinsic existence. You hear that it does not mean much, then you hear it again and again, and after a while, it comes to your mind a vivid conceptual interpretation of it. (1992:51)

In Damasio's words this would sound as: a pattern that brings together the object and the self. Consciousness requires a sort of information that has to match with another structure that arrives from another system, but possesses the same property. As Damasio shows, consciousness is a process created not once and for all, but happens to be generated continuously thanks to an enormous potential of dispositional representation created in the brain through the activation of neural patterns.

The idea that consciousness is about a correspondence of elements occurring synchronously and generated continuously, brings us back to the fascinating ideas of quantum physicist David Bohm, who heads in the same direction with some differences. Bohm's range of thought is quite vast: it embraces quantum physics, the human mind and consciousness, and the entire universe. His vision of reality is holistic in the deepest sense of the term. Starting from the assumption that misguided habits of thought—as for example, to think that reality is constituted by disconnected fragments—are the conditions of the many problems which afflict society and the health of the planet, Bohm's vision asserts that all levels of reality are interconnected, including matter and mind, and to refuse this interconnection produces a distorted vision of reality. He attributes to human thought an extreme importance, because thoughts are assumptions that affect and shape matter and reality broadly. As previously explained, Bohm believes there exists a subtle level of reality: this conclusion is the result of his experimentations on the behaviour of electrons inside a plasma; in this experiment, electrons seemed to be aware of being part of a bigger system.

The idea that subtle and invisible forms of consciousness invest every aspect of matter, a philosophical view close to panpsychism, leads him to address mysticism, as demonstrated by the intense dialogue he maintained with the Indian philosopher Juddu Krishnamurti (1895-1986).As mentioned, some of the sustained dialogue between Krishnamurti and David Bohm is published in books and recordings. Those comprised in the collection *The Limits of Thought* shed light on their challenging explorations on the nature of consciousness and the human condition. What particularly aroused Bohm's interest in Krishnamurti was his deep insight into the question of the observer—which was primarily his interest regarding the meaning of quantum theory. Their dialogue focuses on what happens when one is engaged in the activity of thinking. They argue that thought is a material process unfolding inside the human being, in the brain and nervous system as a whole. So, they analysed how thinking actually takes place, thus considering thought as an event, rather than considering only its content. As we have already seen, Bohm rejects the idea that particles don't exist until they are observed, thus refuting the Copenhagen interpretation of quantum mechanics as formulated by Niels Bohr and Werner Karl Heisenberg. However, he is not against trying to bring consciousness and physics together. He simply feels that most physicists approach the issue the wrong way, fragmenting reality and considering that one isolated thing, consciousness, interacts with another isolated thing, a subatomic particle. But particles, e.g. electrons, are involved themselves in consciousness process, for this reason there is not a real division between matter and mind. In 1980, Bohm presented a mature distillation of his thoughts in a book entitled *Wholeness and the Implicate Order* where holographic theory becomes a framework that includes many aspects of reality*:*

> I would say that in my scientific and philosophical work, my main concern has been with understanding the nature of reality in general and of consciousness in particular as a coherent whole,

> which is never static or complete, but which is in an unending process of movement and unfoldment. (1980:X)

The implicate order is not directly accessible through our senses, due to our innate limitations, and thus goes beyond our senses: it is not possible for humans to grasp it. Because it is an order of reality removed from sensorial perception, we attribute to the implicate order a sense of disorder or randomness. To the contrary, for Bohm the implicate order is a *generative order*. Rather, the explicate order is the order perceived with the senses, and implies the ability to make a selection of finite elements drawn from the infinite implicate order:

> It is clear then that the explicate order of succession, which appears to stand on its own, actually arises out of an organisation that lies in the implicate and generative orders and that is never free from the possibility of collapsing as further data appear. The implicate and generative world is clearly the ground of all experiencing, and the explicate world of succession is constructed out of this ground. Through habits of thought and language people have come to take the explicate world of succession as the true ground and the implicate and generative orders as something that is secondary to such a ground in the explicate world (1987:190).

Thus consciousness appears to be an ebb and flow that is not precisely definable, but that can be considered as a deeper and more fundamental reality out of which our thoughts and ideas unfold. As already shown, according to Bohm the apparent separateness of consciousness and matter is an illusion, an artefact that occurs only after both have unfolded into the explicate world of objects and sequential time. Although Bohm's discourse is less technical than Chalmers' and Metzinger's, it is possible to observe how for Bohm awareness also unfolds thanks to a correspondence between the two systems, the implicate order and the explicate; but above all, awareness is a continuously generated process, a veritable creative process, and the absence of this continuous genesis generates patterns and stiffness that lead to fragmentation of the totality. In this way, an impoverishment of consciousness itself is generated, it becomes blocked by inner conflicts, and

of which social conflicts are nothing but the natural consequence, and in which the resulting perception of reality is inevitably distorted. Awareness is a fresh and always young process, and it implies a unified integration between different levels of reality.

The tendency to relate matter and mind led Bohm in the course of his life to encounter Eastern philosophy. In addition to Krishnamurti, Bohm has had several opportunities to meet with the Dalai Lama who, for his part, strongly believes that a dialogue between Buddhism and scientific thought can contribute to the mission that every Buddhist monk pursues: to alleviate human suffering. And it was precisely in one of these informal conversations, which can be read in the book *The Universe in a Single Atom*, that the Dalai Lama shows how Bohm's holistic conception is not so dissimilar from what the philosopher Nāgārjuna, founder of the doctrine of the middle ground, stated nearly two thousand years before.

As the Dalai Lama remarks:

> In fact, for Bohm as well as for Nāgārjuna, the various extreme ideologies that tend to create oppositions among sections of human kind, such as racism, extreme nationalisms and class struggles are examined in depth. One of the key factors of their origin is the tendency to perceive things as inherently divided and disconnected. From this misconception springs the belief that each of these divisions is essentially independent and self-existent. (2005:52)

Bohm's theory of consciousness also fascinated the Dalai Lama because of its emphasis on a holistic understanding of reality which includes both mind and matter, since it could provide a comprehensive understanding of the world in physical and spiritual sense. A good deal of attention in the long history of Buddhist philosophy has been devoted to understanding consciousness. This attention is motivated by Buddhism's major concerns

on issues of ethics, spirituality and the overcoming of suffering. Already in early Buddhist texts the nature of consciousness was explained in terms of metaphors such as light or a flowing river. The Dalai Lama has closely followed the work of neuroscientists on consciousness. He argues that their deeper question is whether mind and consciousness are more than simple manifestations of the brain, and sensations and emotions more than simple neurochemical reactions. He argues that all Buddhist schools give an unanimous answer to this question: it is impossible to reduce the mental realm to matter.

> For understanding this Buddhist position it is important to understand its theory of causation. The issue of causality has been a major focus of philosophical and contemplative analysis in Buddhism for a long time. Buddhism proposes two principal categories of cause: the "substantial cause" and the "contributory or complementary cause". When you try to trace the beginning of the substantial cause, you can't posit any beginning at all. You can have fluctuations, but there isn't any absolute beginning to the continuum. If you posit a beginning, then all sorts of inconsistencies arise in relation to the question of why it came about in the first place. (2005:133)

> According to Buddhism, though consciousness and matter can and do contribute toward the origination of each other, one can never become a substantial cause of the other. (2005:131).

In fact, the Dalai Lama believes that pure thought can effect a change in the chemical processes of the brain, showing an interdependence between mind and matter, which however neuroscience still has to track down.

> The most common position in neuroscience is to think that neural processes give rise to thought and not the contrary, thus considering neural processes in a sense of unidirectional causality. (2005:72)

We found a circularity of enaction within Buddhist thought that reminds us of quantum physics, when it finds there exists an interaction between subject and object where one can be influenced and modified by the other.

The Dalai Lama clearly sees that the effort made by neuroscience to provide an explanation for consciousness as emanating from the brain stands in contrast with the core of Buddhist mysticism. Brain, neural signature or neural correlates by themselves are not exhaustive in the explanation of consciousness, he argues.

This chapter explored the meaning of consciousness and how consciousness gives meaning. For some, consciousness is due to neural processes inside the brain (Damasio, Metzinger), while for others it is an enaction between mind and matter (Dalai Lama, Chalmers) according to some still unknown physical law, common to both universe and brain (Penrose), which posits an exchange between implicate and explicate orders (Bohm). These views all share the intuition that consciousness is about the formation of special patterns arising simultaneously and synchronously according to particular arrays of information. In the next chapter, I will argue that an important characteristic of consciousness is that created mental patterns need to be either modified or discarded to adapt to a constantly changing environment, and that art plays a great role in this regard, since it has the unique power to break established mental patterns and cultural moulds.

## 6 Art: Breaking the Pattern Into Unknown Circuits of Consciousness.

In 2005, during his speech to graduating seniors at Kenyon College, the novelist David Foster Wallace began by telling a short story:

> There are these two young fish swimming along, and they happen to meet an older fish swimming the other way, who nods at them and says "Morning, boys. How's the water?" The two young fish swim on for a bit, and then eventually one of them looks over at the other and goes, "What the hell is water?"

Using this anecdote as introduction, the writer goes on to highlight the importance as well as the difficulty of knowing the environment one is immersed in, and the ways in which it is possible to attain such knowledge. He advises college graduates to pay attention to every little thought, even the most banal ones—in fact, especially the banal ones—that cross their minds. In fact, it is possible to choose what to think, to choose to cultivate some thoughts rather than others. It is an exercise that helps one avoid being immersed in induced thoughts and feelings. Choosing one's thoughts means to avoid being guided by the automatic thoughts and feelings produced in reaction to the environment that one is immersed in. There is otherwise the risk of becoming less aware of one's own behaviour. It has been already explained how knowledge is a process in constant motion, which draws its activity from an infinite range of possibilities. Whether this potential resides in the brain, due to its hundreds of trillions of possible neural connections, or is an ethereal entity located outside the body is not important for the purpose of this research. What must instead be emphasized here is how consciousness is a proactive creative process in constant motion. Consciousness is not some kind of pre-existent truth that needs to be reached, but is rather a process that requires a certain amount of creativity. Thanks to consciousness it is possible to find one's way in reality by having a clear and fresh perception of what surrounds us. Inversely, without consciousness one finds oneself living within defined schemes, applying

knowledge in an automatic way to read ever-new realities, which are never identical to the previous ones, in the same way. Reality here also corresponds to an inner and subjective reality. In the essay *Through the Vanishing Point: Space in Poetry and Painting* (1968), Marshall McLuhan wrote that we all suffer from a grave illness, the rear-view-mirror syndrome according to which:

> We look at the present through a rear-view mirror. We march backwards into the future. [...] The common human instinct affects us in such a way that people flee these new environments and rely on the rear-view mirror as a sort of repetition or "recourse" from the previous environment, thereby provoking a sense of total disorientation. (1968: 33)

Many authors support the argument that thorough the breaking of mental patterns humans can generate creative acts and access new knowledge. Here I use the term pattern mostly as a mental condition that can be subject to crystallisation, and from which our vision of reality can be conditioned by applying pre-existing mental frameworks to novel situations. Bohm's concept of the explicate order can be considered as isomorphic to McLuhan's theory of the *rear-view-mirror syndrome*: both work as a kind of pattern, a structure that shapes thought, opinions and the perception of reality. The problem for Bohm is that these patterns, once they are absorbed at both individual and collective levels, shape our vision of reality but create automatisms in perception and thought that don't allow for the perception of new orders and relationships, an ability that is at the core of the learning process. In *On Creativity* (1996), Bohm unfolds a conceptual background in which he argues that there are three basic attitudes of the spirit: the scientific, the artistic and the religious. The unity they had in traditional societies was broken by the fragmentation that came about with modern culture:

> The best point of departure for studying these questions is perhaps a consideration of the fact that man has a fundamental need

> to assimilate all his experience, both of the external environment and of his internal psychological process […] In primitive times, science, art and religion, interwoven to form an inseparable whole, seem to have been the major means by which this assimilation process worked. (1996 [1998]: 19)

According to Bohm, art would have the function of preparing the individual, both sensitively and spiritually, to understand the importance of general scientific knowledge, and this in relation to one's own problems.

> The preparation of the spirit is needed also to better absorb the scientific attitude to see the fact as it is, whether one likes it or not, and in this way to eliminate conflict. As a result, art would help the individual to approach modern life in the way that was done before by art, science and religion. (1996 [1998]: 21)

What is relevant for this thesis is noticing that David Bohm introduces the idea that science does not achieve progress following a static and absolute method, but thanks to a mental attitude that is strikingly similar to that of the artist: an attitude in which the nervous system works as a whole, leaving behind the typical fragmentation of the mind posited by Descartes and Newtonian mechanics. It is also a mental attitude that avoids external influences and automatic behaviour. Bohm also mentions how naming emotions and concepts tends to crystallise and fix them; and especially that by naming a concept one is shaping the ways of perception. Bohm divides human thought according to two big archaic mental patterns: reactive and reflective thought. Reactive thought is what establishes reliable patterns and regularities in experience. On the contrary, reflective thought allows the perception of new aspects of reality, without resorting to what is already known:

> The function of reflective thought, which involves the whole of the nervous system in an imaging process, is to accommodate the anomaly, reorient the pattern of reactive thought and re-establish homeostatic equilibrium. In this respect, reflective thought is of a higher order than reactive thought. (1998: VII)

Then, he makes a further division between thought and a higher-order quality of the mind: intelligence:

> Thus, one way in which intelligence became manifest is by organising the categories, orders and structures of the intellect in new ways. It may orchestrate feeling in an ever changing movement. Such a movement goes beyond the sort of succession of fixed patterns of feelings. In its depths, such intelligence can involve no separation between knowing, feeling, and will. (1987: 219)

Creativity is a quality of the mind that responds to humankind's fundamental need to assimilate all its experience and the environment. Science, art and religion, in fact, have this original role for men and women:

…"to make them feel at home" (1996 [1998]: 19).

As discussed in the previous chapter, the conceptual framework that grounds the book is the consideration that three basic attitudes of the spirit exist, prior to its fragmentation at the aforementioned Cartesian moment. Science, art and religion, in ancient times worked together as a unique mental attitude able to assimilate the external environment and the internal psychological perception in a unique process. Bohm does not refer to a specific scientific method through which to reach knowledge, but he refers to a certain mental quality of men to create new structures that help people adapt to the ever-changing environment, which is perpetually in flux. One salient aspect of this kind of intelligence is that its perceptual field does not allow being conditioned by any of the established patterns, by any past knowledge.

> the deep source of intelligence is the unknown and indefinable totality from which all perception originates. Clearly, then, intelligence is not to be regarded as a result of accumulated knowledge which could be learned, for example, as a science or as a technique. Rather, it can perhaps best be regarded as an art—the art of perception through the mind. (1996 [1998]: 43)

Thus, intelligence does not use past experiences to perceive reality but perceives it in a whole and immediate manner. Bohm dedicated a chapter of his book to the relationship between science and art. Art and science can still find a common property in beauty. Beauty makes sense only if it deals with truth: This does not mean "an absolute truth" but one that is "true to itself" (1996 [1998]: 69). Due to a gradually increasing awareness that scientific theories cannot be mere reflections of nature, artists and scientists create an accommodation to reality that is not just a pure reflection of it.

> To be sure, the scientist must test his truths with the aid of instrumental observations and mathematical equations, while the artist must do so with direct perception, in a more subtle way that is much harder to explain verbally. In spite of this difference, however, it seems to me that art has, and always has had, a certain factual aspect, in the sense that a good work of art must be coherent in itself, as well as with the basic natural laws of space, colour, form, light, and of how they must be perceived. It does not seem to be really possible for the artist to manipulate these in a completely arbitrary way, directing his work merely by the criterion of producing something that is pleasing to himself and to other people. (1996 [1998]: 26)

So Bohm considers that art can be useful in the context if it provides the mental attitude, that is to say, the perceptive tools and abilities to be able to deal with reality in a creative way. He considers that science and art have always been close and coherent in this sense because none of them was actually interested in a mere reflection of reality, but most likely in the creation of new paradigms. Consequently, it is in the sense that art can be better compared to science: because it also creates new ways in which men perceive and understand their environment. Thus, people's response to the current situation, namely modern life, should be to approach life in a way that had been previously accomplished by art, science and religion. Art and science for Bohm can be integrated to make the implicit order of the environment emerge that is not yet visible. In fact, even more inefficient than speaking about a universal method in science, is to consider the

possibility of its existence for art. Rather, every single artist creates his own instruments and his own method to express a personal vision of the world. Another author who utilises the term pattern as a model through which one sees reality is Thomas Kuhn. In his book, he uses many examples derived from the rich experimental literature of Gestalt psychology to advance the suspect that a paradigm may be a prerequisite to perception itself:

> …when the normal-scientific tradition changes, the scientist's perception of his environment must be re-educated in some familiar situations he must learn to see a new Gestalt (1962:112).

Kuhn however makes an important difference between the paradigm shift and the gestalt switch:

> That parallel can be misleading. The scientist does not preserve the gestalt subject's freedom to switch back and forth between ways of seeing. After a scientific revolution occurs the world of his research will seem, here and there, incommensurable with the one he had inhabited before. [....] Reorientation by paradigm is a process that involves handling the same bundle of data as before, but placing them in a new system of relations with one another by giving them a different framework. (1962:85)

Then, Kuhn also clarifies also a fundamental difference between pattern and paradigm:

> But it will shortly be clear that the sense of "model" and "pattern" that permits the appropriation of the term is not quite the one usual in defining paradigm. In grammar, for example, "amo, amas, amat" is a paradigm because it displays the pattern to be used in conjugating a large number of other Latin verbs, e.g., in producing "laudo, laudas, laudat". In this standard application, the paradigm functions by permitting the replication of examples any one of which could in principle serve to replace it. In a science, on the other hand, a paradigm is rarely an object for replication. (1962:23)

Therefore, a paradigm shift is a condition that breaks patterns of perception and thought, which for a long time had been used to give an explanation to certain phenomena, so that new knowledge can emerge. A paradigm

contains the possibility of detecting anomalies and the ability to modify itself. Kuhn argues that revolutions in science occur when modes of perception are altered:

> What someone is able to see at a certain moment depends not only upon the ability of seeing but also on what his previous experiences allows him to see. (1962: 4)

Therefore, in a new paradigm, scientists need to learn to see again. But the most interesting aspect of this change, for the purposes of the present research, is that according to Kuhn this mental shift is related to a mental attitude that contains a creative aspect. In fact he says that when a scientist adopts a new paradigm it is possible to speak of an experience of *conversion*:

> Just because it is a transition between incommensurables the transition between competing paradigms cannot be made a step at a time, forced by logic and neutral experience. Like the gestalt switch, it must occur all at once (though not necessarily in an instant) or not at all. (1962:150)

It seems that a scientist, as well as an artist need a kind of illumination, or an intuition that allows them to see and organise the world within a new and fresh view. Arguing against a universal scientific method, Feyerabend uses the historical example of the Galilean revolution to show how it was possible—not just by applying scientific methods, but also including some irrational elements—to obtain access to new knowledge. The refusal of the idea that the earth actually moved had been supported for centuries with Aristotle's argument of the tower, which was based on the interpretation of the observation of nature. Galileo used a refined strategy of persuasion as propaganda: he deployed psychological tricks and a highly abstract language in order to affirm the relativity of all motion and the law of circular inertia. Galileo's largest effort to was not only to demonstrate his theory, but to find a way to break the old pattern of seeing things that

hampered the new theory. The successful outcome of the Galilean revolution was the result of the combination of observational methods with the application of (some even irrational) ad hoc theories. With this example, Feyerabend calls for intellectual opportunism and advocates an anarchistic epistemology. But when Feyerabend chose the term "anarchistic" he did not use it in the commonly understood political sense. Actually, he wanted to be remembered as a flippant Dadaist, and not as a serious anarchist philosopher:

> A Dadaist would not hurt a fly—let alone a human being. A Dadaist is utterly unimpressed by any serious enterprise and he smells a rat whenever people stop smiling and assume that attitude and those facial expressions which indicate that something important is about to be said. A Dadaist is convinced that a worthwhile life will arise only when we start taking things lightly and when we remove from our speech the profound but already putrid meanings it has accumulated over the centuries ("search for truth"; "defence of justice"; "passionate concern"; etc., etc.) A Dadaist is prepared to initiate joyful experiments even in those domains where change and experimentation seem to be out of the question. (1975: 11)

Breaking a pattern in this context is intended as the way to get rid of an old opinion to free our attitude to see the world in new and creative way. This approach also makes sense also when one more closely examines the mechanisms that rule the brain. In the context of neuroscience, Antonio Damasio, uses the term pattern to indicate the generative neural structures that are necessary for our survival:

> Memory is essentially reconstructive […] images are momentary constructions, attempts at replication of patterns that were once experienced. […] I suspect that explicit recalled mental images arise from transient synchronous, activation of neural firing patterns largely in the same early sensory cortices where the firing patterns corresponding to perceptual representations once occurred. The activation results in a topographically organized representation. (Damasio 1994: 100)

> What dispositional representations hold in store in their little commune synapses is not a picture per se, but a means to reconstitute a "picture". (1994: 102)

> Dispositional representation constitute a full repository of knowledge, encompassing both innate knowledge and knowledge acquired by experience. Innate knowledge is based on dispositional representation in hypothalamus, brain stem and limbic system. You can conceptualize it as commands about biological regulation which are required for survival. They control numerous process, by and large they do not become images in the mind. The acquisition of new knowledge is achieved by continuous modification of such dispositional representations. (1994: 103)

Yes, one needs fixed patterns, but one also needs to break some of them in order to adapt to a constantly changing environment. However, I am suggesting that if we assume that creative processes arise from breaking old patterns and the creation of new ones, in order to make us perceive inner and outer reality without any external conditioning, art can then be considered as that discipline especially suited for the continuous generation of new patterns of consciousness. In this context, Ernst Von Glasersfeld—the father of radical constructivism and one of the fathers of cybernetics—can be considered the ultimate spokesperson regarding the importance and value of art within the cognitive process:

> Physicists such as Bohr, Schrödinger, Heisenberg or Dirac, had long realised that what we call knowledge is and can only be built of concepts that we derive from experience and therefore cannot be supposed to represent a world beyond the experiential interface. Psychologists and biologists still cling to the belief that the models they construct are somehow uncovering a "real" world. Once you get rid of the traditional pre-conceptions, all of which are easy to recognise as metaphysical fictions, you cannot avoid the conclusion that the relation between our experience and an independent universe is something we cannot even begin to investigate. The only way out of the world of experience are pious fictions, that cannot provide a glimpse of a knower-independent reality. Only painters, poets, musicians and other artists like mystics and metaphysicians, may generate metaphors of reality,

> but to comprehend these metaphors you have to step out of the rational domain. (2010)

This quote emphasises how every vision of reality, included the scientific one, requires a big dose of creativity; and a rigid and logical pattern can act as a barrier against reading and properly navigating an ever-changing reality. After exploring the concept of pattern, it is relevant to also take into account the concept of *emergence* given that it can work as a sort of alternative. The history of this concept started in the first decades of the twentieth century. It doesn't have a precise definition; thus it has a large spectrum of applications. This concept is in between dualistic (mind-body) and materialistic (only matter) positions, and tries to overcome them. Varela, Thompson and Rosch understand emergence as "connectionism", a concept derived from the idea that in several cognitive systems composed by many single elements seem to be more efficient when guided by a clear set of rules. Some examples of these cognitive tasks are "memory and vision:"

> This passage from local rules to global coherence is the heart of what used to be called self-organization during the cybernetic years. (1993:88).

> Examples of emergent properties can be found in the most diverse domains, from lasers, to genetics, networks and ecology. However, the common trait among all these different phenomena is that for all of them at a certain point "a network gives rise to new properties" [...] In such a system, the meaningful items are not symbols; they are complex patterns of activity among the numerous units that make up the network. (1993:99).

> Thus in the book, the concept of emergence serves the authors to make their point that there is nothing that can be recognised as a "Self" in the cognitive domain (1993:70)

> The concept of absence of a Self goes against some part of the Western tradition as best exemplified in the Cartesian and Kantian claim that the observed regularity or pattern of experience requires that there be an agent or mover behind the pattern (1993:70).

Thus, the relationship between cognitive science, emergence of properties, pattern recognition and Buddhism is synthesised by the authors as follows:

> Within cognitive science, the emergence encompasses the concepts of self-organization and emergent properties of cognitive processes, especially in connectionist models. Within Buddhist psychology, it includes the emergent structure of mental factors within a single moment of experience and the emergence of the karmic causal patterning of experience over time. (1993:XIX)

This conception of karma contrasts with the popular notion of karma as predestination. Rather, karma consists of repetitive forms of behaviour that the subject should try to avoid in his life. Karma constitutes a description of how psychological habits form, and become permanent over time.

> The Buddha was said to have discovered on the eve of his enlightenment not only the momentariness of the arising of the aggregates but also the entire edifice of causality, the circular structure of habitual patterns, the binding chain, each link of which conditions and is conditioned by each of the others that constitutes the pattern of human life as a never-ending circular quest to anchor experience in a fixed and permanent self. [...] This circle is also called the Wheel of Life and the Wheel of Karma. (1993:110)

> Karma constitutes a description of psychological causality, how habits form and continue over time. (1993:111)

Many Buddhist techniques are aimed to interrupt this chain of automatic conditioning or karma. If we put it in relation with the conception of art, one of the most amazing of these techniques is the Kālacakratantra ritual. Kālacakratantra initiation rites are a collection of prayers, teachings and rituals designed to activate the seed of enlightenment that is dormant in all living beings. It is a branch of Buddhism diffused in Tibet through the Vajrayāna, Tantric, Tantrayana and Diamond Way schools of Buddhism, and is part and parcel of its most esoteric interpretations. The ritual's function is to create a mandala of coloured sand, a circular geometric composition representative of the wheel of time, in which the Buddha appears in over 700 expressions of his nature. The faithful revolve around it, trying to get

inspired to reach their inner balance. At the end of the ritual, a mandala is destroyed to demonstrate the impermanence of all earthly things. The portrait of the Wheel of Life is intended to show how karmic causality actually works. There are twelve links (called *nidanas*) in the circular chain. The circle is an analytic structure that can be used to describe events of any duration from a single moment to a lifetime or, in the Buddhist view, to many lifetimes. Metaphorically, it can be said that these motifs have a fractal character: the same patterns seem to appear even when the scale of observation by orders of magnitude changes. Twelve mind qualities combined together can generate all mental phenomena: ignorance, volitional action, consciousness, the psychophysical complex, the six senses, contact, feeling, craving, grasping, becoming, birth, decay and death.

> The practitioner, building the Wheel of Life, can meditate on this aggregates that in life could create repetitive patterns, and through meditation break the wheel of conditioned origination and become aware, wise, and free (1993:111).

The teachings of no-self, the five aggregates, some form of mental factor analysis, karma and the wheel of conditioned origination are common to all of the major Buddhist schools. As Giangiorgio Pasqualotto remarks, the East does not have as developed theory of aesthetics as the West. The fact that in Oriental philosophy there is no such discipline as aesthetics in the same sense as it exists in the West is extremely revealing. This is due to the fact that, in general terms, Oriental thought does not have the same radical separation between theory and action, and theory and experience that infuses Western philosophy. As I have already explained, Buddhist philosophy brings together a broad corollary of practices and meditation techniques, which are able to integrate theory and experience, third and first persons. Accordingly, Pasqualotto remarks that art practices are in themselves forms of meditative exercises that put at the centre of their focus the presence and efficacy of the void (1994). For the purposes of this research, I intend to, once again, point out how Western art, especially

contemporary art, can have the same function of Eastern meditative practices; not so much for its achievements, but for the processes they trigger if one accepts the hypothesis that artistic practices as well as meditative practices are means to generate new patterns and thus to stop automatic and repetitive visions of reality. And if we accept that awareness is a creative process, also generative and in continuous movement, we can further appreciate the function of art and consider it as one of the most valid means of knowledge, which generates processes of awareness. What characterises contemporary art is the variety of situations presented to the spectator acting in contrast to the natural tendency of the brain to always look for regularity. Contemporary art also gives us productions involving all the senses, including the "mental" sense. Mind and body in contemporary art are integrated and confront us with a total experience.

According to Marshall McLuhan, the arts in our society offer a wide range of situations for the exercise of sensory perceptions because art works as an anti-environment that allows us to perceive the environment, which otherwise would be imperceptible (1968 [1996]: 25).

> By this I mean to say that because of the invisibility of any environment during the period of its innovation, man is only consciously aware of the environment that has preceded it; in other words, an environment becomes fully visible only when it has been superseded by a new environment; thus we are always one step behind in our view of the world. (1996:4)

The tendency of humans is to be conditioned by past experiences. This is an idea that can be found in various contexts: philosophy, epistemology, neuroscience, art and meditation. McLuhan is known for his profound interest in the effects that technology has on our lives and minds. He starts from the assumption that technologies, any technology, mechanical or electronic, are extensions of ancient or tribal senses that humans lost over time and that technologies are trying to restore, to imitate. McLuhan insists on the important role of the artist in contemporary society, because s/he is

the one not only able to intuit what the effects of a new technology or predominant medium in society will be at the moment in which this medium is predominant (and not, as the rest of the world, once it has become obsolete); but also because his/her role is to prepare society and make it aware of these effects:

> The artist analyses the distortion in sensorial life produced by new environmental programming and tends to create artistic situations that corrects the sensorial biases and shocks caused by the new form. From this perspective, the artist is not the traveling sales person of ideas or noble experiences. He/she is rather the indispensable aid both to action and reflection. We live in the first age when change occurs sufficiently rapidly to make such pattern recognition possible for society at large. Until the present era, this awareness has always been reflected first by the artist, who has had the power—and courage—of the seer to read the language of the outer world and relate it to the inner world. (McLuhan1968 [1996]: 255)

It is significative that McLuhan does not distinguish between art and science as such:

> the artist is a person in any field, scientific or humanistic, who grasps the implications of his actions and of new knowledge in his own time. (McLuhan 1964: 6)

For McLuhan, Western society is currently experiencing an age of transition. The advent of technology has brought with it a powerful identity crisis, due to humankind's progressive distancing from its primeval roots. Despite this, McLuhan maintains that the new electronic era amplifies our senses, senses that were long repressed by the modern era, creating an opportunity for evolution and integration for mankind and its deepest senses, as well as a new search for cosmic harmony that would transcend time and space. This senses include telepathy, universal consciousness and a sense of unity. He is quite critical about technologies but at the same time he tries to generate positive future projections in which technologies could bring humans together again and make them feel like a unique entity, for example, thanks to electronic technologies and the internet, through which

human can share a unique platform of communication. In this sense, he sometimes allowed him to express some mystical thoughts, admitting that "mysticism is just tomorrow's science dreamed today". (1969:19) In this sense, he also wrote about the need for Western culture to become more Eastern:

> To undertake a further effort to internalise Eastern values, to bring human conscience back to a position of equilibrium between knowledge of the outside world and inner awareness (1968 [1996]: 272).

I would like to conclude this chapter with the words and the concepts of Sarat Maharaj—a South American professor of Indian origin—who expresses very well which kind of knowledge art generates, and why it is important, in his dialogue with Francisco Varela, which is edited by Hans-Ulrich Obrist. At the same time that Varela was making a considerable effort to demonstrate that a pure distinction between first- and third-person methods of observation was impossible to sustain, Sarat Maharaj explored the practice of visual arts as a kind of non-knowledge, a concept rendered by the Sanskrit term of *Avidya*, putting into question the assumption that knowledge is meant only as a variety emphasised by the established disciplines. So Avidya, or non-knowledge, contrary to appearances is not anti-knowledge:

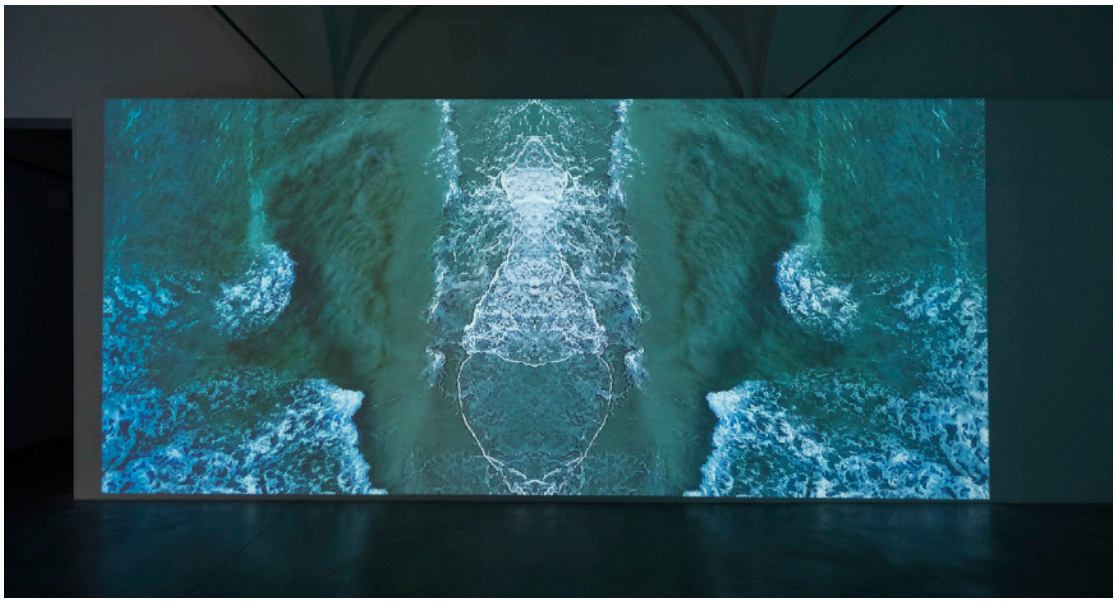
> For non-knowledge, I use the Sanskrit term Avidyā. The word Vidyā means to see, to know. It gives us the Latin word "video" (see) and the modern word "video", as in VCR. When we put a suffix "a", normally we intend to report something like its opposite, "ignorance". But "a" can also neutralize rather than deny, as we find in the middle terms, indeterminate as in typical chains <atypical>untypical or moral <amoral>immoral.
>
> The middle term highlights the shortcomings for the polar opposition "knowledge/ ignorance", but puts into question the assumption that knowledge is simply what is pursued by established disciplines. So Avidyā, or non-knowledge, contrary to appearances

> is not anti-knowledge, unless you do not imagine it in terms of an interesting thing as the anti-matter. It is quite a slip of structural elements and information, which dissolves them as they try to settle down and settle in the institutional disciplines. [...] As part of knowledge systems, cognitive-creative process relies on the transfer and transmission of that which is already known. It concerns to trace-to repeat-to reproduce and the representation of canonical and pre- packed elements. Avidyā is more about producing, generating new forms of thinking-feeling-knowing, the creativity in first-person, the unknown circuits of consciousness. Treat the practice of visual arts, by thinking today, as a condition in which everything can happen. (Sarat Maharaj 2000 [2003]: 553)

It now becomes evident how recent studies are moving from a conceptualisation of knowledge related to the ability of understanding at a cognitive level, to an idea of knowledge which is more related to the operation of consciousness. This approach brings into play a more complex process that requires the inclusion of every aspect of the physical and phenomenal domains and where creativity gains a central position—as that mental quality capable of generating new patterns for the interpretation of reality, something which makes art a higher form of human consciousness.

## 7. ***"Like Waves and its Ocean"***

> I want the chart to work like an echo chamber or a diffraction grid, producing wave interferences that make many kinds of patterns on the active recording neural tissues of readers. (Donna Haraway 1997: 232)



Sarah Ciracì, *Like Waves and its Ocean* (2017)**,** video installation view, 10x3 meters, Duration 18 minutes, installation view: MATA, Modena, Italy.

"*Like waves and its ocean"*, is a transposition in the form of a video installation of the contents covered by the present thesis. It is inspired by the traditional Buddhist text, the *Laṅkāvatārasūtra*, which offers a poetic and metaphoric language through which it is possible to glean an immediate intuitive and meditative understanding of what consciousness means for this philosophical tradition. The video installation includes and combines Western approaches on the topic of consciousness and attempts to transpose the conceptual meaning in the metaphoric visual language employed in the art work. The Laṅkāvatārasūtra (412 - 433 CE), belongs to the Mahāyāna

school, which, of all the currents of Buddhism is the one that has focused most systematically on investigating the mind, starting from the discourses promulgated by the Buddha, (ca. 450 BCE). In particular, the Laṅkāvatārasūtra, asserts that all the objects of the world, and the names and forms of experience, are merely manifestations of the mind and posit consciousness as an essential factor of animate existence without which there would be no individual life. Despite consciousness being a universal topic, differences in idiom, culture and history are reflected by the language in which one talks about it. For example the Tibetan word *namshe*, or its Sanskrit equivalent *Vijñāṇa*—which is usually translated with the English notion of consciousness— actually includes not only conscious experiences, but also what we would define subconscious experiences, according to modern psychology and psychoanalysis. Furthermore, the signification of Tibetan word for "mind" relates not only to the realm of thought, but also to that of emotion, an assumption which although going against the grain of Western philosophy, corresponds to the findings of neuroscience, as illustrated by neuroscientist Antonio Damasio, who emphasizes that thought and emotion are strictly associated. (1999) In very general terms, all Buddhists schools refer to six experiences of consciousness phenomena: sight, hearing, smell, taste, touch and the mental states, the latter considered as an organ of sense, which produces conceptual consciousness. The Yogācāra school—a school associated with Indian Mahāyāna Buddhism, but which also includes practices from other schools— considers instead eight experiences. The Sutra, according to Yogācāra school, enumerates the six basic Buddhist typologies of consciousness, related to the six senses plus the two senses of the mind: *obscuration consciousness,* the consciousness which, through fear, gathers the hindrances, poisons and karmic formations; and the *storehouse consciousness* (ĀlayaVijñāna); the consciousness at is the basis of the other seven. The term Ālaya means "abode, dwelling", and Vijñāna "consciousness".

The ĀlayaVijñāna forms the “base-consciousness” or “causal consciousness”. The store-house consciousness accumulates all potential energy for the mental and physical manifestation of one’s existence and receives impressions from all functions of the other consciousness’, and retains them as potential energy, or “seeds”, for their further manifestations and activities. Since it serves as the container for all experiential impressions, it is also called the “seed consciousness” or container consciousness. *ĀlayaVijñāna* is the repository where things are hoarded for future use, remaining in a potential state until a new conscious experience causes the seed to sprout, for a new cognition. Thus ĀlayaVijñāna is neutral, and does not discriminate or judge as do the others conscious senses. The metaphor utilized in the Sutra to explain ĀlayaVijñāna is the ocean with its waves: the ocean is the neutral storehouse consciousness; the wind corresponds to the agitated mind that produce concepts such as “I” and “other” which operate the discrimination that brings the subject-object duality. The wind’s agitation it is activated by the six senses spheres and in turn create experiences that are manifested by the waves, which are not recognized as objects made of the same substance as the ocean, but an independent nature is attributed to them. The Sutra suggests in poetic words that consciousness is a non- stop creative movement and teaches that, when the movement became settled and fixed, it makes us perceive distorted reality and lose the sense of unity. The Sutra offers a clear statement in opposition to Cartesian dualism and creates a sense of wholeness between who observes (the human sense) and the object observed (the ocean, which contains a potential, still not defined infinite consciousness). The art work I realized allows me to represent through elaborate digital visuals most of the concepts discussed in the thesis such as: the dependence between subjects and objects, wholeness, tacit ground, space information, potential state,

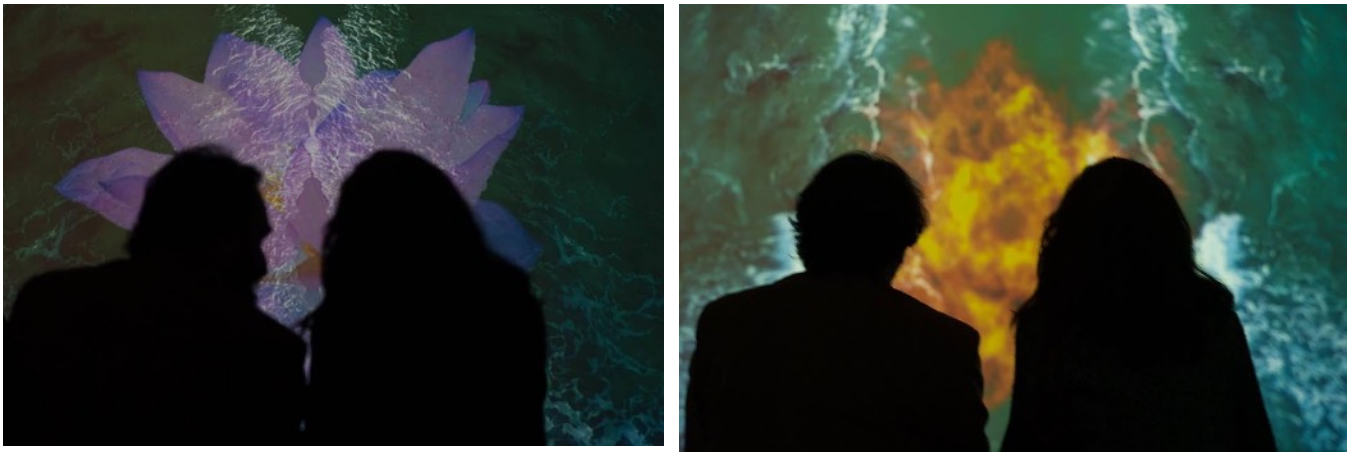
movement, superposition, entanglement, synchronicity, patterns and wave oscillations, all key concepts associated with consciousness phenomena.

The video installation is composed by shooting the sea from the top, on a plane parallel to the sea, with the camera hanging from a drone at an altitude of one hundred metres. The images were then duplicated and mirrored, assembled and synchronized, creating a constant movement, with the waves generating symmetrical patterns by continually touching each other as if they were dancers. This wave movement is alternated with images that I overlay on the top of the waves: they have no logical meaning in terms of the order of appearance. They just suggest a mind that continuously generates images, whether real, abstract or fantastic objects. In the process of overlapping these images, which I did with After Effects software, I created a movement that makes these images seem as if they arose from the patterns created by the collision of the waves. The video installation was shown for the first time in 2017 in a group show curated by Fulvio Chimento and Luca Panaro at the MATA art museum in Modena, Italy, entitled *Effimera*.

Sarah Ciracì, *Like Waves and Its Ocean* (2017)**,** video installation, 10x3 meters, Duration 18 minutes, installation view: MATA, Modena, Italy.

Within MATA, the video projection took a space ten metres in width and three metres in height, for a duration of eighteen minutes.

What was presented to the public was a giant, continuous movement, where unpredictable shapes emerged from the waves of the ocean. It was a great satisfaction for me to watch the spectators linger in the fruition of the work for a long time, as if they were hypnotized and captured by this continuous generator of shapes.

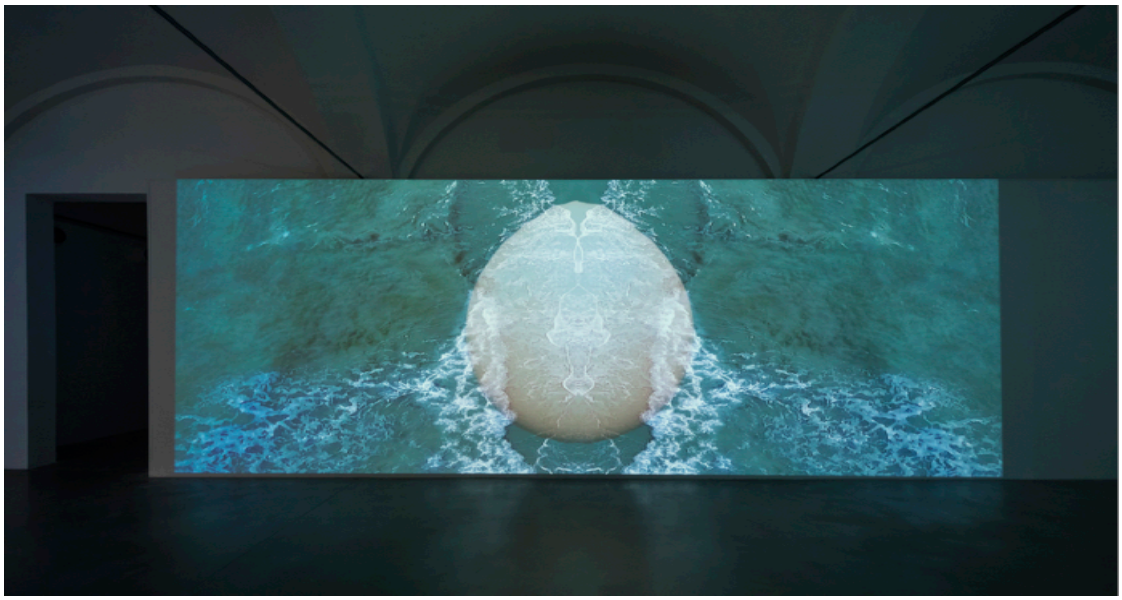


Sarah Ciracì, *Like Waves and Its Ocean* (2017)**,** video installation, 10x3 meters, Duration 18 minutes, installation view: MATA, Modena, Italy.

The audio was composed by musician Massimilano Viel. He recorded his breath and then modified it; the result is a sound that resembles the wind. The metaphor of the ocean as a unique phenomenon, a wholeness entity, can be associated with David Bohm's conception of the implicate order, which came into his mind while observing the behavior of particles inside a plasma in which electrons seemed to be aware of being part of a bigger system.

When David Bohm refers to the *implicate* order he refers to a *generative order,* a process that, with its unending movement, spread out a selection of infinite elements, perceivable with our senses in another level of order, the *explicate*. The explicate order which gives us the illusion of standing on its

own. We are unable to recognize that what we see (the waves) is merely the product of our limited system of perception (the wind), instead of seeing that they belong to the same reality (the ocean). Bohm's vision asserts that all levels of reality are interconnected, including matter and mind, and to refuse this interconnection produces a distorted vision of reality, creating afflictions that reflect social conflicts and human suffering. Furthermore, for David Bohm, the implicate order works as a tacit ground. The ĀlayaVijñāna is also neutral phenomena, but for both it is a prerequisite of all experiences. As long as the ĀlayaVijñāna is left to himself, out of reach of senses consciousness, out of existence, out of the activity of the mind and senses, it will remain imagelessness, without indiscrimination, although it always lies in the background. Mahayana's main theory of cognition, expressed in the Sutra, assert the existences of two kind of knowledge: one is based on mind-only needed to grasp the absolute, and the other it is necessary to understand existence in its dualistic aspect where logic prevails and the Vijanas (the conscious senses) are active.

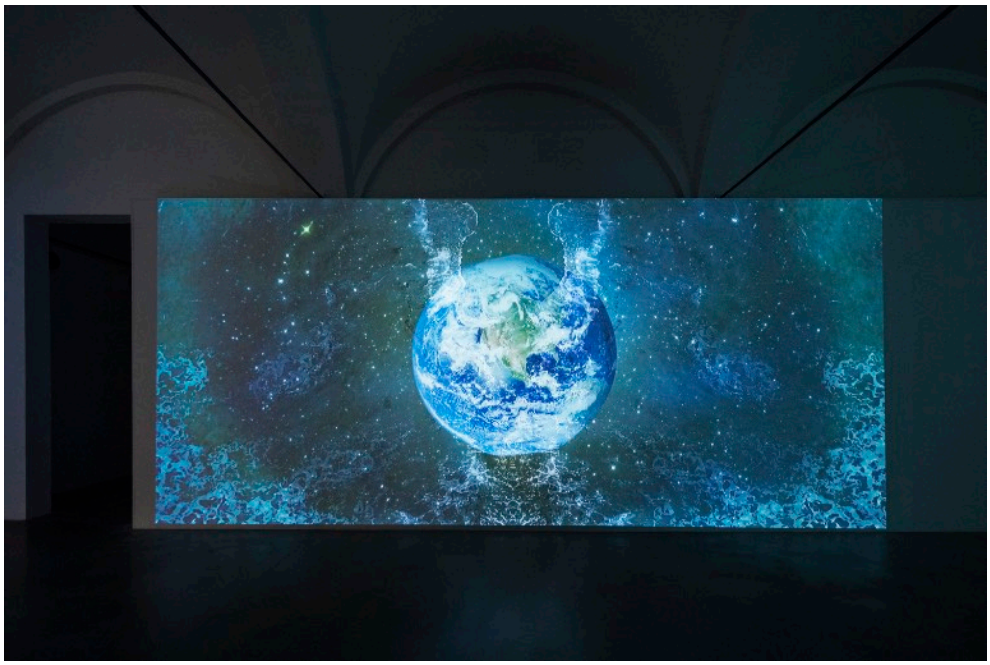


Sarah Ciracì, *Like Waves and Its Ocean* ***(2017),*** video installation, 10x3 meters, Duration 18 minutes, installation view: MATA, Modena, Italy.

As already shown, according to Bohm the apparent separateness of consciousness and matter is an illusion, an artifact that occurs only after both have unfolded into the explicate world of objects and sequential time.

There is a correspondence between the two system (the implicate and the explicate) and consciousness is a continuously generated process based on their interaction, a veritable creative process. The absence of this continuous genesis generates the fixed patterns and stiffness that lead to a fragmentation of the totality. Accordingly, the philosopher David Chalmers is looking for a possible law that relates physical states (the brain activities) with the phenomenal, the qualia, the subjective consciousness experience, a law that he proposes to call "*psychophysical law*". In following the panprotopsychism hypothesis as discussed in the fifth chapter, Chalmers tries to focus on the idea that an information space exists, conceived as an abstract space, that consists of a number of states, as a basic structure in which consciousness may emerge by the way in which information organize themselves from different relationships between those states. This abstract space can be intuitively and metaphorically associated with the infinite and neutral, but at the same time potential, ocean. Similar to the Lankavatara sutra, Chalmers argues that consciousness belongs to both domains, the physical and the phenomenal, because we can find that information in both of them, they are mutually exclusive, similar to the relationship that exists between the ocean, belonging to the physical world, and the wind (the objective mind) belonging to the phenomenal domain. It is from the encounter and the reciprocity between these two domains, the physical and the phenomenal, that states of consciousness emerge. Chalmers considers it likely that there might be consciousness in any dimension in which there is a kind of information processing. He lingers to analyse the syntactic aspect of this information space more that to consider them from a semiotic point of view. He talks about functional isomorphisms, i.e. the characteristics of

two complex structures that can be superimposed upon each other, so that they share in a corresponding manner the various parts of their structures. Metaphorically, the ocean, agitated by the waves, creates structures, patterns and shapes, which the mind, activated by the senses, can capture. They correspond to internal perceptive patterns and therefore can generate an image. The image give us the illusion of being objective, but in reality it is just an infinitesimal portion of an infinitely deep potential reality, which contains endless possible structures.



Sarah Ciracì, *Like Waves and Its Ocean* (2017)**,** video installation, 10x3 meters, Duration 18 minutes, installation view: MATA, Modena, Italy.

The philosopher Thomas Metzinger refers to our consciousness as a model activated by the brain, a biological machine, a model that he calls the Ego tunnel, through which we perceive reality, not a reality in itself but a little portion of it, only the portion of reality that the model allows us to perceive.

> It is just as your physics teacher in high school told you: out there, in front of your eyes, there is just an ocean of electro-magnetic radiation, a wild and raging mixture of different wavelengths. Most of them are invisible to you and can never become part of

> your conscious model of reality. What is really happening is that the visual system in your brain is drilling a tunnel through this inconceivably rich physical environment and in the process is painting the tunnel walls in various shades of color. *Phenomenal* color. *Appearance*. For your conscious eyes only. (2009:20)

Even if Thomas Metzinger bases his consciousness research on a scientific perspective, thanks to his collaborations with neuroscientists, he somehow reaches the same conclusion as David Chalmers: consciousness is a special kind of "*information processing*". In order to reach a state of consciousness, this information must integrate data from our interactions with the world, but the most important feature is that this integration must occur into a simultaneous whole, one in once.

The prerequisite of synchronicity was observed during measurement, using EEG neuroimaging technologies, of brain gamma waves oscillations during the meditation process of Tibetan monks, in the laboratories of the neuroscientist Antoine Lutz, at the Waisman Lab for Brain Imaging & Behavior at the University of Wisconsin, Madison. (Neurophenomenology). It has been noted that the greatest amplitude of brain wave oscillations ever detected in scientific literature are precisely those activated by Tibetan monks during meditation. It looks like forty times per second is the speed necessary for neurons to fire in synchronicity to obtain unity and wholeness, and therefore processes of consciousness. It is precisely these characteristics, the speed at which neurons are ignited in a synchronic and coordinated manner to distinguish states of consciousness from unconscious perceptions. This is technically the mechanism that regulates consciousness states, and under certain circumstances the ocean appears just as a calm surface devoid of shapes (perceptions). As Antonio Damasio states, with his theory of dispositional representation, it also requires a continuous movement, it is not a process created once and for all, rather a sway of

neural patterns. Neurons must fire in accordance, at certain rates and amounts of time, otherwise the waves would not form. But even more importantly, the lesson learned from Damasio is that the acquisition of new knowledge, that is to say new consciousness, occurs thanks to the continuous modification of old dispositional representations. The ocean is thus a perfect metaphor for the process of consciousness, where the wave patterns are constantly modified so that no wave is equal to another.

We need fixed patterns to survive but also we need to break out of some of them in order to adapt to a constantly changing environment and reach higher and more creative forms of knowledge. In the video installation hereby presented, by mirroring the wave footage, I wanted to visualize the concept of synchronicity, a prerequisite which is necessary for consciousness to arise, as recent findings in neuroscience have highlighted. When the waves collide with each other synchronously, in a continuous movement, indistinct shapes are formed and, as in a Rorschach test, they wait to be associated with recognizable objects, or better, to invent new ones. The work maintains two levels. One level shows the waves colliding, leaving the spectator the space to generate and visualize personal images in his mind, on the other level I suggest the idea of an active thinking mind, through the overlapping of random images of my choice. Not only is synchronicity a condition to create a wholeness phenomenon such as consciousness, but simultaneity is also needed, i.e. the capacity that different alternatives of a large number of different activities, can coexist at the same moment, and they occurred one in all. A strange behavior that in quantum physics goes under the name of superposition. The video installation recalls the physical phenomenon of diffraction, even if technically the collision of the waves does not cause natural diffraction phenomena. Nevertheless, the digital effects that overlap the ocean wave

rhythm create continuous patterns as diffraction does with light waves. In the book *Meeting the Universe Halfway*, (2007) Karen Barad, quoting Donna Haraway in the book "*Modest_Witness_Second_Millennium" (*1997) builds a theoretical framework with the metaphor the physical phenomena of diffraction:

> Diffraction patterns record the history of interaction, interference, reinforcement, difference. Diffraction is about heterogeneous history, not about originals. Unlike reflections, diffractions do not displace the same elsewhere, in more or less distorted form, thereby giving rise to industries of metaphysics. Rather, diffraction can be a metaphor for another kind of critical consciousness at the end of this rather painful Christian millennium, one committed to making a difference and not to repeating the Sacred Image of Same. Diffraction is askew of Christian narrative and Platonist optics, in their Sacred secular technoscientific story cycles as well as their more orthodox manifestations. Diffraction is a narrative, graphic, psychological, spiritual, and political technology for making consequential meanings. (Donna Haraway 1997: 273)

As Karen Barad shows, diffraction is the perfect metaphor for abandoning the idea that science is a mere reflection of realityy. Rather she proposes *agential realism* (2007) in which there exists entanglement between matter and meaning, between object and subject, so that the latter two are not set in advance but the boundaries between them are produced every time we observe reality, so that reality is ontologically founded on entangled relationships.

> Diffraction is a material-discursive phenomenon that challenges the presumed inherent separability of subject and object, nature and culture, fact and value, human and nonhuman, organic and inorganic, epistemology and ontology, materiality and discursivity. Diffraction marks the limits of the determinacy and permanency of boundaries. […] Diffraction is not merely about differences, and certainly not differences in any absolute sense, but about the entangled nature of differences that matter. (2007: 381)

She dedicates many pages to explain the diffraction phenomena, in which we can observe quantum superposition. When two ocean waves overlap, the amplitude of the resultant wave is a combination of the original two waves, thus the resultant wave is said to be linear combination or superposition of the component waves.

> Diffraction not only brings reality of entanglements to light, it is itself an entangled phenomenon. (2007: 73)

> Superpositions do not represent mixtures of particles with determinate properties. Rather, superpositions represent ontologically indeterminate states—states with non-determinate fact of the matter concerning the property in question. (2007: 265)

For Karen Barad and Donna Haraway, diffraction is a metaphor to change the way we interpret reality, Penrose thinks that technically our brain, the way how neurons act, creates superposition phenomena and randomness states from which consciousness arises.

From a creative point of view, I found the diffraction phenomena very inspiring when associated with my personal methodology. Common to many of my artistic works is the tendency to accumulate as much information as possible about the theme I'm dealing with and waiting for a shape, a pattern, to emerge out of the interference of all this information. The shape that all that information will take is unpredictable until the process is complete. It is as if all this information, as Penrose likes to describe these phenomena, generated a kind of orchestra, which plays until a clear image forms in the mind. This is the most fascinating, almost magical, phase of the artistic process. It seems as if gravitational waves were emitted from the collision of black holes, providing the information needed to bring harmony to our theory of space-time. In fact when I recognize that what I was waiting for has finally reached my mind, I exclaim: it works, it does make sense! As with the diffraction phenomena, all the information coming

from different directions, colliding with each other, creates a new pattern. Usually this pattern, or idea, contains the complete artwork, I need to only add few details. All at once is prerogative of the process through which consciousness seems to be generated, according to the observations of scientists such as Penrose and Damasio and philosophers of science like Chalmers and Metzinger. Also paradigms shifts described by Thomas Kuhn seem to adhere to the same principle: a change of paradigm does not follow a linear and logical process but occurs simultaneously in all milieus and fields.

The quantum nature of consciousness proposed by Penrose and associated with the creative process seems to fit perfectly with the view I have of my own personal creative process. According to quantum theory, different alternatives at the quantum level are allowed to coexist in linear superposition, exactly like waves create the diffraction through which new patterns and creative new ideas are generated. All that occurs, occurs at once. It is interesting to note that the process I followed to write this concluding chapter started from the video installation I created as I was studying for the thesis. It has now enabled me to trace back all the stimuli, impulses and influences that hit me, both consciously and unconsciously, to conceive it. It is usually impossible for me to chart the genesis and evolution of one of my works, since it flickers in my mind all at once in a discrete moment of time. This thesis has given me the opportunity to explore my aesthetics and how it relates to the epistemology of science and Buddhist notions of the mind. In the guise of conclusion, I wish to go back to my early art works: reality is just what we want to see in it, like when I read in Duchamp the conviction that alien messages being concealed in his work. Perception is interpretation, this is what modern physics tells us and what contemporary art should deal with.

At that time the Blessed One recited the following verses:

99. Like waves that rise on the ocean stirred by the wind, dancing and without interruption.

100. The Alaya-ocean in a similar manner is constantly stirred by the winds of objectivity, and is seen dancing about with the Vijnanas which are the waves of multiplicity.

101. Dark-blue, red, [and other colours], with salt, conch-shell, milk, honey, fragrance of fruits and flowers and rays of sunlight;

102. They are neither different nor not-different: the relation is like that between the ocean and its waves. So are the seven Vijnanas joined with the Citta (mind).

103. As the waves in their variety are stirred on the ocean,
so in the Alaya is produced the variety of what is
known as the Vijnanas.

104. The Citta, Manas and Vijnanas are discriminated as regards their form; [but in substance] the eight are not to be separated one from another, for there is neither.

105. As there is no distinction between the ocean and its waves, so in the Citta there is no evolution of the Vijnanas.

106. Karma is accumulated by the Citta, reflected upon by the Manas, and recognised by the Manovijnana, and the visible world is discriminated by the five Vijnanas.

(47) 107. Varieties of colour such as dark-blue, etc., are presented to our Vijiiana. Tell me, Great Muni, how there are these varieties of colour like waves [on the ocean] ?

108. There are no such varieties of colour in the waves ; it is for the sake of the simple-minded that the Citta is said to be evolving as regards form.

109. There is no such evolving in the Citta itself, which is beyond comprehension. Where there is comprehension there is that which comprehends as in the case of waves [and ocean].

110. Body, property and abode are presented as such to our Vijnanas, and thus they are seen as evolving in the same way as are the waves.

111. The ocean is manifestly seen dancing in the state of waveness; how is it that the evolving of the Alaya is not recognised by the intellect even as the ocean is?

112. That the Alaya is compared to the ocean is [only] for the sake of the discriminating intellect of the ignorant ; the likeness of the waves in motion is [only] brought out by way of illustration.

(1923 [2005]:42-43)

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# Appendix 1: Published texts



TA 9 (2+3) pp. 433–438 Intellect Limited 2011

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ON PERCEPTION

**SARAH CIRACÌ**
NABA Academy of Arts and Design

# Smart Grid: The possibility to increase connectivity through a system of individual energy sharing



**ABSTACT**

*This article is a reflection of the project 'Welcome Aboard', which I collaborated on in 2011, with two scientists Nicola Armaroli (Ist. ISOF/CNR, Bologna and Molecular Photoscience Group, Bologna) and Vincenzo Balzani (Department of Chemistry G. Ciamician, University of Bologna). The video establishes a dialogue based on Buckminster Fuller's 'World Game' where they offer possible scenarios for our planet running under renewable energy sources. Ultimately, a democratic system of energy sharing, between consumers and suppliers, was proposed to be put at the forefront. The article begins with David Bohm's focus on how a collective thought process can have drastic affects on our society. He proposes that we recognize the 'whole' in which we live to avoid becoming a society of fragmented incoherency. Similarly, as an engineer Buckminster Fuller has devoted himself to finding an effective action to change the world through a global approach, which he calls a whole-system perspective. The technology of the Smart Grid, proposed in the dialogue between the two*

**KEYWORDS**

whole/fragmentation
comprehensive thinking/ specialization
Smart Grid
trascendence

*scientists of 'Welcome Aboard' in which every individual produces, shares and consumes energy (electricity), seems to be a new tool that could be combined with other technologies to provide a connectivity between human beings.*

'Tacit Ground' is an invisible system of thought sharing.

(Bohm 1996)

According to David Bohm, everything around us has been determined by thought, whether tangible or intangible. Thoughts are framed by assumptions, which create cities, cars, nations and religions. Every thought is actually a subtle tacit process. And what we can say *explicitly* is only a very small part of it. Most of our actions are generated by tacit knowledge, which Bohm refers to as a *tacit ground*. Each individual's thoughts are a part of this unique tacit ocean of meanings. Realizing this makes us a part of a whole, which is beyond general human understanding. We are able to contribute to the whole, yet a common difficulty exists to see the entire picture. Each individual has a perspective that he or she relates to the truth; this causes a fragmentation in society, which leads to an incoherent world.

Humans continually seek a unique truth in all things. This is evident from religion to science. Bohm affirms that for many science has become the religion of our modern age, which is used as a tool to arrive at a unique truth. However, science works well when applied to isolated incidents, but breaks down when faced with the whole. Meanwhile, assumptions are manifest in each individual's opinion, which ultimately can cause danger as solutions of the past are imposed on the present. These past assumptions are commonly defended by instinctive and emotional reactions (Bohm 1996).

Marshall McLuhan states 'We look at the present through a rearview mirror. We march backwards into the future' (1964).

Bohm insists on the importance of recognizing the 'whole', which we belong to now more than ever due to the rapidness of globalization.

## R. BUCKMINSTER FULLER: WORLD GAME VS. WORLD WAR – SHARING KNOWLEDGE AND FINDING SOLUTIONS DEMOCRATICALLY

There are many similitudes between David Bohm's and Buckminster Fuller's thoughts. Although using different terms, that is, fragmentation and wholeness for Bohm, and specialization and comprehensive thinking for Fuller, both of them stress the importance of integrating a global vision. A society that is not mindful of the 'whole', according to Bohm, first leads to societal incoherence, which later develops into a global disequilibrium, while over-specialization for Fuller leads to extinction.

For Fuller, specialization has become an erroneous concept linked with success in our society. 'All universities have been progressively organized for ever finer specialization. Society assumes that specialization is natural, inevitable, and desirable' (Fuller 1968). Fuller further delves into how the communal concept, 'there isn't enough to go around', came into place. For him, the first possible origin of this is rooted in a world governed by an endless state of wars. This ideology is rooted so firmly in our thinking that we do not even seek to question it.

The process that created this seemingly irrefutable truth began with the second law of thermodynamics. Its entropy revealed that every machine

progressively kept losing energy, until it eventually ran out. This led, according to him, to the false conclusion that wealth and life are subject to the same conclusion.

Second, Thomas Malthus cautioned that man is multiplying at a geometrical rate, while food is multiplying at an arithmetical one.

Lastly, the third came for him when Charles Darwin explained his theory of animate evolution, stating that survival was only for the fittest.

According to Fuller, these three concepts gave politicians the ability to dominate since these Malthusian–Darwinian entropy concepts were in fact absolute scientific laws. Politicians, having an automatic bias, are committed to defend and champion their own ideas. Each assumes the validity of their assumptions, which Fuller synthesizes in his 'you-or-me-to-the-death struggle' formula, which, according to Fuller, is so strongly crystallized in common government that other options to war are not even contemplate.

When governments are given feasible solutions to water desalinization, they simply respond that it costs too much. But there seems to be an inexhaustible budget for war. Politicians are able to accredit weaponry acquisitions and military tasks costing many times over their previously asserted budget. Fuller declares that, 'There is no energy crisis, food crisis, or environmental crisis. There is only a crisis of ignorance'. He is in fact in an intense opposition to global sustainability and reinforces that all problems in fact have a global solution. Regrettably, all intellectual and technological resources are continually used for war.

Fuller was an incurable optimist who devoted his intellectual resources to search for global solutions that would allow all humanity to live satisfactorily. With this aim, he invented the 'World Game' or 'World Peace Game'. The World Game that Fuller envisioned was to be a place where individuals or teams of people could compete, or cooperate to 'Make the world work, for 100% of humanity, in the shortest possible time, through spontaneous cooperation, without ecological offense or the disadvantage of anyone' (Fuller 1970).

As a result of Fuller's invention, the *Dymaxion Map*, a flat map of the Earth's surface, which portrays the planet as an island in an ocean without distortion, or disconnected continents, further utilizes the 'Game' to bring about a proper global perspective, at the same time remaining mindful of the entire world. 'We are all passengers aboard the Spaceship Earth'. Today, due to globalization, this vision is even clearer, yet there are still many nations 'trying to steer the spaceship in different directions' (Fuller 1960).

Fuller, being mindful of an intense opposition, subversively named his ideology the 'game'. His desire was to include everyone in on the global issues that concern the world, and not just a few elite, or scientifically specialized.

Similarly, another subversive thinker, Paul Feyerabend, called for free science from political ideologies.

> This implies that experts (scientists) must be under be under supervision of 'super experts' (philosophers) so that they remain in an academic place of research. Plato would approve, but I wouldn't. I think that citizens in a free society possess a responsibility to all of the issues at hand including ones of prostitution, science, and philosophy. Therefore, for me all scientific proposals should be mandated by a democratic council of scientists and citizens with consideration to how their results may apply.
>
> (Feyerabend [1981] 1984)

The World Game was 'intended to be a tool that would facilitate a comprehensive, anticipatory, design science, approach to the problems of the world' (Wikipedia). Fuller was ahead of his time is this respect, since he proposed this idea in the 1960s when both personal computers and the Internet were vastly inaccessible.

## WELCOME ABOARD, 2011

In June of 2011, I worked on a video project entitled Welcome Aboard requiring the collaboration of two scientists, Nicola Armaroli and Vincenzo Balzani. They published a book entitled *Energie per L'Astronave Terra/Energy for the Starship Earth*, which won the Galileo prize as better divulgative scientific book. I asked them to play with the ideals of the World Game and provide solutions to the energetic crises. The result was an interesting dialogue about coexisting on a planet that reinforces Fuller's global vision.

After understanding the advantage and disadvantages of our main sources of energy (oil, coil, gas, nuclear, etc.) and what they cost in terms of wars and health problems, the scientists proposed a scenario where renewable sources of energy could be used all around the world more democratically and with far less damage than the traditional ones. They are currently in the works to develop a technology that can create energy based on hydrogen obtained through solar photosynthesis.

I would like to focus on a new technology called the 'Smart Grid', which would allow us to distribute energy produced from renewable sources. 'A smart grid is a digitally enabled electrical grid that gathers, distributes, and acts on information about the behavior of all participants (suppliers and consumers) in order to improve the efficiency, importance, reliability, economics, and sustainability of electricity services' (Wikipedia). This new technology, already underway, will allow all individuals to produce energy, electricity, and share through a network. As a result, the general public will become more aware of their energy consumption and be able to self-regulate their use by knowing the exact cost that fluctuates according to the time of the day. If this technology is able to prevail, we will advance to a global parallel of connectivity beyond the Internet, which will inevitably decentralize energy suppliers and put people at the frontlines of their own network of energy sharing.

McLuhan states that 'the medium is the message', and that our perception changes improving the 'retribalation' that is in place every time a new non-specialist technology is introduced in a society.

> Similarly, a very much greater speedup, such as occurs with electricity, may serve to restore a tribal pattern of intense involvement such as took place with the introduction of radio in Europe, and is now tending to happen as a result with TV in America. Specialist technologies detribalize. The non-specialist electric technology retribalizes.
>
> (McLuhan 1964)

When the first images of Earth were sent from the Apollo Spacecraft, some 40 years ago, they were also coupled with the first time that all of humanity was able to visualize the planet, and its population, as a whole. The advent of the Internet only progressed this consciousness where each of us is a part of a unique organism, a flow of meaning.

The Smart Grid is a response to the need of transcendence that technology has brought to light. Roy Ascot declares that

> Computer networking, in short, responds to our deep psychological desire for transcendence – to reach the immaterial, the spiritual – the wish to be out of body, out of mind, to exceed the limitations of time and space, a kind of biotechnological theology. This is the scope and ambition of networking.
>
> (Ascott, 2003)

When considering the importance of technology in society, we also need to be mindful of how to utilize it in an ethical way. The Smart Grid can foster a stronger democratic society and become a reality if it is removed from the 'tacit ground' and made manifest in our lives.

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## CONTRIBUTOR DETAILS

Sarah Ciracì is an artist. She was born in Grottaglie (TA), Italy, in 1972 and currently lives and works in Milan. She has taken part in numerous group shows and solo exhibitions in private galleries and international museums. Her work is present in prestigious international art space museums. In 2004, she obtained an acknowledgement from 'Premio New York', a fellowship at Columbia University. In 2007, she participated as an artist in residence to ACAC, Aomori Contemporary Art Center, in Aomori, Japan. Since 2009, she

has been teaching Video/Art Directing courses at the NABA Academy of Arts and Design in Milan, Italy.

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# Appendix 2. Press review

artemagazine

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Foglio 1 / 2






Sabato, 18 Marzo 2017 17:32

## Modena, parte la seconda edizione di "Effimera – Suoni, luci, visioni"

Scritto da Redazione



**L'edizione 2017 di Effimera si concentra sull'analisi della componente immateriale che è caratteristica della ricerca artistica dei nostri giorni. Carlo Bernardini, Sarah Ciracì e Roberto Pugliese sono gli artisti invitati che hanno realizzato tre imponenti installazioni ambientali**

Sarah Ciracì, Like an ocean with its waves, 2017

MODENA - Alle 18.00 di sabato 18 marzo, prende il via, **al MATA di Modena,** la nuova edizione di ***Effimera – Suoni, luci, visioni,*** che giunge quest'anno alla sua seconda edizione. La manifestazione, a cura di **Fulvio Chimento e Luca Panaro**, ha lo scopo di individuare e valorizzare artisti, preferibilmente italiani e con esperienza all'estero, che fanno dell'utilizzo avanzato della tecnologia la cifra stilistica del proprio lavoro. L'edizione 2016 aveva individuato il suo punto focale nel web, inteso come strumento di conoscenza artistica e relazionale grazie alla presenza degli artisti **Eva e Franco Mattes, Carlo Zanni e Diego Zuelli.**



## FLASH NEWS

### Sisma Centro Italia. Recupero opere d'arte a Pievebovigliana

MACERATA - Tra le opere recuperate dalla cattedrale di Pievebovigliana, piccolo borgo del Maceratese, tra cui alcune litografie raffiguranti le...

### Agrigento, anfore bizantine nella casa di un imprenditore

AGRIGENTO - Due anfore bizantine e un vaso d'epoca medievale sono state rinvenute nell'appartamento di un imprenditore, arrestato lo scorso...

Il fil rouge che contraddistingue ***Effimera*** è rappresentato dall'intento di indagare l'arte attraverso le sue componenti immateriali. Non a caso dunque il nome della rassegna si ispira anche a quello della specie animale che ha vita più breve sulla terra, l'Ephemera, un piccolo insetto acquatico (simile a una libellula) la cui esistenza dura all'incirca un'ora e mezza. Altro assioma fondante di Effimera è il constatare come l'unicità dell'opera non sia più un assunto dell'uomo contemporaneo: grazie alle tecnologie di cui disponiamo, ogni copia è riproducibile con la medesima qualità, e quindi è sempre potenzialmente identica all'originale. La nuova edizione di Effimera si concentra quindi sull'analisi della componente immateriale che è caratteristica della ricerca artistica dei nostri giorni.

Quest'anno vengono proposte opere di **Carlo Bernardini, Sarah Ciracì e Roberto Pugliese**, che hanno realizzato tre imponenti installazioni ambientali, separate ma contigue, che marcano una distinzione linguistica e temporale, e al tempo stesso suggeriscono una linea di continuità all'interno del percorso evolutivo dell'arte. Arte intesa come esperienza totale e totalizzante, in grado di stimolare l'intelletto, ma anche di innescare un corto circuito a livello sensoriale.

I 500 mq del MATA sono stati suddivisi quindi in tre ambienti distinti. Punto di partenza di questo "attraversamento" è costituito dalla ricerca sonora del sound artist Roberto Pugliese, mentre l'approdo si identifica nelle installazioni luminose in fibra ottica di Carlo Bernardini, dipanando il percorso fra le immagini fluttuanti degli affreschi digitali di Sarah Ciracì.
Un ricco calendario di incontri collaterali, che prevede la presenza degli artisti coinvolti, di filosofi e di esperti del settore "arte e tecnologia", farà da corollario alla rassegna che resterà aperta fino al 7 maggio 2017.

**Vademecum**

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Redazione

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## Ultimi da Redazione

- Milano. L'Appartamento del Principe di Palazzo Reale ospita "Codice di avviamento

## MOSTRE*

Milano. L'Appartamento del Principe di Palazzo Reale ospita "Codice di avviamento fantastico"
Un progetto a cura di Davide Quadrio e Massimo Torrigiani concepito appositamente per le stanze dell'Appartamento del Principe.


Il progetto site-specific di Sislej Xhafa per i Cantieri Culturali alla Zisa di Palermo
Si intitola "Infermeria" ed è realizzato appositamente per questo spazio ex industriale oggi interamente dedicato alla cultura. La mostra, a cura di Paola Nicita, sarà visitabile dal 17...

L'emozione dei colori nell'arte. Foto
La rassegna, ospitata al Castello di Rivoli Museo d'Arte Contemporanea e nelle sale della GAM-Galleria Civica d'Arte Moderna e Contemporanea di Torino, ripercorre, attraverso 400 opere,...

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# EFFIMERA – Suoni, luci, visioni

**18 marzo – 7 maggio 2017 MATA, via della Manifattura dei Tabacchi 83, Modena**

**EFFIMERA – Suoni, luci, visioni**
**Carlo Bernardini, Sarah Ciracì, Roberto Pugliese**
**a cura di Fulvio Chimento e Luca Panaro**

**18 marzo – 7 maggio 2017**
**MATA, Modena**

Inaugura **sabato 18 marzo** alle ore **18.00** al **MATA di Modena** una nuova edizione di ***Effimera – Suoni, luci, visioni***, a cura di **Fulvio Chimento** e **Luca Panaro** e in collaborazione con la **Galleria Civica di Modena**, che quest'anno propone opere di **Carlo Bernardini**, **Sarah Ciracì** e **Roberto Pugliese**. La mostra è realizzata con il supporto di Coptip e del Gruppo Fotografico Grandangolo BFI.

***Effimera*** giunge dunque alla sua **seconda edizione**, coerente con l'intento dichiarato dai suoi curatori già nel 2016: **individuare e valorizzare artisti**, preferibilmente italiani e con esperienza all'estero, **che fanno dell'utilizzo avanzato della tecnologia la cifra stilistica del proprio lavoro**. Un evento espositivo che si propone quale indagine critica in relazione alle ultime tendenze artistiche caratterizzate dai "Nuovi Media", momento di crescita e di aggregazione a livello nazionale intorno a parole chiave quali arte, tecnologia e comunicazione.

Nel 2016 ***Effimera*** aveva individuato il suo punto focale nel web, inteso come strumento di conoscenza artistica e relazionale grazie alla presenza degli artisti Eva e Franco Mattes, Carlo Zanni e Diego Zuelli. La nuova edizione si concentra sull'**analisi della componente immateriale** che è caratteristica della ricerca artistica dei nostri giorni, che trova trasposizione (e sintesi) all'interno di un percorso espositivo che prevede la creazione di un viaggio sensoriale interno alle tendenze artistiche recenti.

Nel 2017 i curatori hanno dunque strutturato i **500 mq del MATA in tre ambienti distinti**. Punto di partenza di questo "attraversamento" è costituito dalla **ricerca sonora** del sound artist **Roberto Pugliese**, mentre l'approdo si identifica nelle **installazioni luminose in fibra ottica** di **Carlo Bernardini**, dipanando il percorso fra le **immagini fluttuanti degli affreschi digitali** di **Sarah Ciracì**.

***Effimera – Suoni, luci, visioni*** è costruita intorno a un **percorso spiccatamente immersivo**, idesto e strutturato appositamente sul MATA: **tre imponenti installazioni ambientali**, separate ma contigue, marcano una distinzione linguistica e temporale, e al tempo stesso suggeriscono una linea di continuità all'interno del percorso evolutivo dell'arte. Arte intesa come esperienza totale e totalizzante, in grado di stimolare l'intelletto, ma anche di innescare un corto circuito a livello sensoriale.



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UN PIZZICO DELL'ANTICA SAGGEZZA POPOLARE

**"La paura è normale che ci sia, l'importante è che sia accompagnata dal coraggio" di Paolo Borsellino**

**Traduzione letterale:**

**Significato:**

INVIA IL TUO PROVERBIO | ALTRI PROVERBI

Per rimarcare le distinte peculiarità d'approccio i curatori hanno coinvolto artisti appartenenti a tre generazioni differenti, nati rispettivamente negli anni Sessanta, Settanta e Ottanta, che riflettono altrettanti modi di intendere l'interazione tra arte e tecnologia. Il *fil rouge* che contraddistingue Effimera è sempre rappresentato dall'intento di **indagare l'arte attraverso le sue componenti immateriali**, al fine di far luce sullo statuto attuale dell'opera. I lavori degli artisti di ultima generazione, infatti, si caratterizzano per la spiccata componente effimera legata al procedimento artistico che rispecchia l'epoca nella quale viviamo. Non a caso il nome della rassegna si ispira anche a quello della specie animale che ha vita più breve sulla terra, l'*Ephemera*, un piccolo insetto acquatico (simile a una libellula) la cui esistenza dura all'incirca un'ora e mezza. Altro assioma fondante di *Effimera* è il constatare come l'unicità dell'opera non sia più un assunto dell'uomo contemporaneo: grazie alle tecnologie di cui disponiamo, ogni copia è riproducibile con la medesima qualità, e quindi è sempre potenzialmente identica all'originale.

Fa da corredo a Effimera un ricco **calendario di incontri collaterali** che prevede la presenza degli artisti coinvolti, ma anche di filosofi ed di esperti del settore "arte e tecnologia".

**mostra** Effimera – Suoni, luci, visioni
**sede** MATA, via della Manifattura dei Tabacchi 83, Modena
**a cura di** Fulvio Chimento e Luca Panaro

**periodo** 18 marzo – 7 maggio 2017
**inaugurazione** 18 marzo ore 18
**apertura alla stampa** 16 marzo ore 11.30 (a seguire visita alla mostra con i curatori)
**in collaborazione con**
Comune di Modena e Galleria Civica di Modena
**con il sostegno di**
Coptip e Gruppo Fotografico Grandangolo BFI
**catalogo** APM Edizioni, Carpi (Italy), bilingue, contenente il testo critico dei curatori Fulvio Chimento e Luca Panaro, la riproduzione iconografica delle opere esposte a colori, e l'elenco completo delle opere in mostra.

**orari** dal giovedì alla domenica 11.00-13.00 / 16.00-19.30 (ingresso libero)

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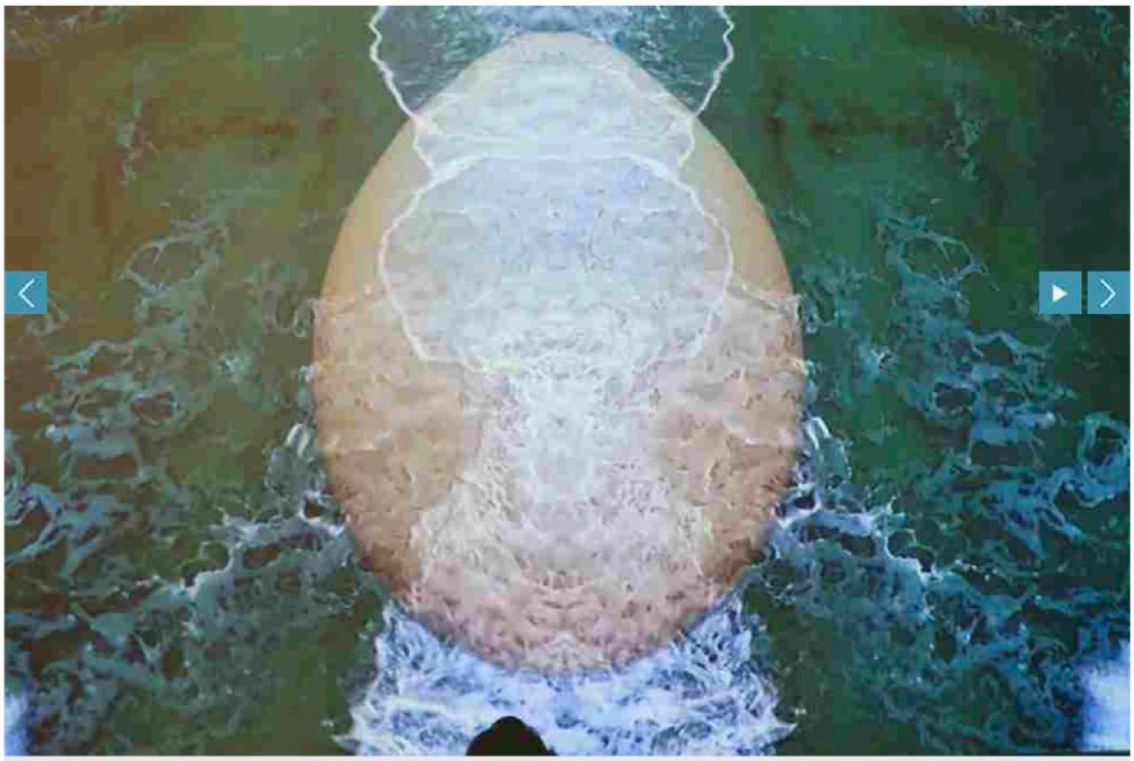
17 marzo 2017

# Effimera la luce si fa scultura al Mata

MOSTRE EFFIMERA 2017





Suoni, luci, visioni. E ricerca attiva di artisti giovani che si misurano con le nuove tecnologie, le ultime frontiere della comunicazione e i nuovi media. C'è questo al centro della seconda edizione di "Effimera" al Mata di Modena nello spazio espositivo di via della Manifattura Tabacchi 83 a Modena. Ecco alcune foto dell'esposizione. Foto di Gino Esposito

17 marzo 2017

17/03/2017 - VIDEO

LA STAMPA

168 0

# A Modena la nuova edizione di "Effimera - Suoni, luci, visioni"



Al MATA di Modena inaugura la nuova edizione di Effimera – Suoni, luci, visioni, a cura di Fulvio Chimento e Luca Panaro e in collaborazione con la Galleria Civica di Modena, che quest'anno propone opere di Carlo Bernardini (1966), Sarah Ciracì (1972) e Roberto Pugliese (1982). La mostra nasce con l'intento di individuare e valorizzare artisti che fanno dell'utilizzo avanzato della tecnologia la cifra stilistica del proprio lavoro. Visitabile dal 19 marzo al 7 maggio 2017.
Informazioni: tel.059 4270657, **mata@comune.modena.it** , **www.mata.modena.it**

Link Embed

http://www.lastampa.it/2017/03/17/multimedia/cultura/arte/a-modena-la-nuova-edizione-di-effimera-suoni-luci-vis

## ARCHIVIO

A Pompei la mostra di Michelangelo Pistoletto per Giornata del paesaggio


Tutte le sfumature del rosso nell'arte del '500

Si entra gratis alla Galleria Nazionale di Roma ma senza controlli di sicurezza

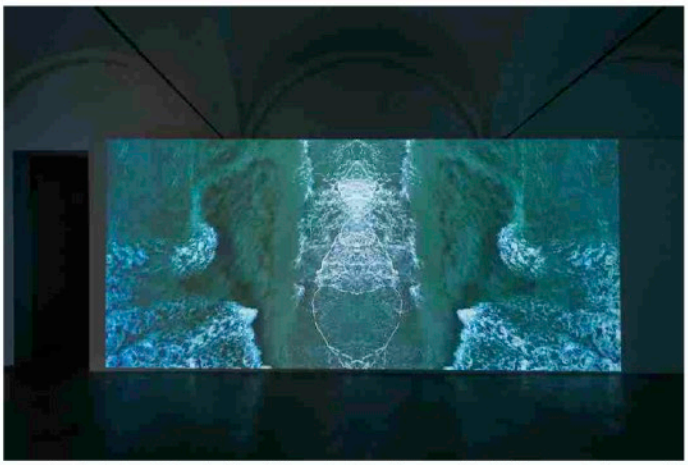
Eventi



# Effimera, seconda edizione

redazione 16/03/2017

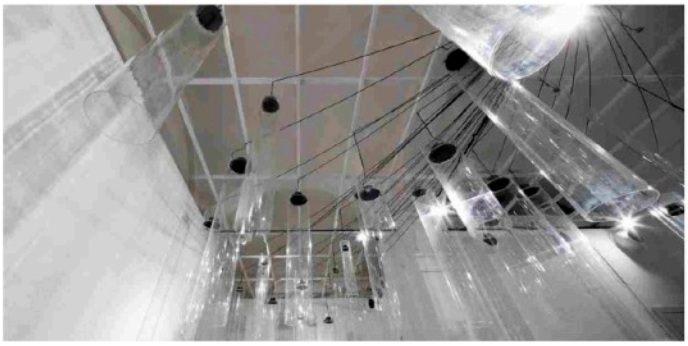
Quattro chiacchiere con Fulvio Chimento e Luca Panaro curatori dell'appuntamento annuale dedicato all'arte e alla tecnologia



Con un invito datato 28 aprile Yves Klein, nel 1958, chiamava il pubblico a partecipare nella Galerie Iris Clert di Parigi all'*Exposition du Vide*. Una delle più grandi operazioni di smaterializzazione impresse nella storia: nessun quadro appeso alle pareti, solo il vuoto a occupare lo spazio. Alla base di *Effimera*, progetto espositivo ideato da **Luca Panaro** e **Fulvio Chimento** e giunto quest'anno alla sua seconda edizione, c'è la stessa volontà di sottrazione: «come anticipa il nome – spiega Panaro – in mostra non c'è nulla di fisico, di scultoreo, di concreto. Punto in comune degli artisti scelti è quello di lavorare con lo spazio». La rassegna, al Mata di Modena dal 18 marzo al 7 maggio, mantiene un format analogo a quello dell'anno scorso: tre ambienti per tre artisti e altrettanti lavori.

Ma se il filo conduttore dell'anno scorso era Internet e le sue possibili declinazioni, in questo caso a ridefinire lo spazio sono tre elementi: il suono, la luce e il video, declinati nei diversi lavori di **Roberto Pugliese, Sara Ciracì** e **Carlo Bernardini**. «La missione – racconta Chimento – è sempre la stessa: indagare il rapporto tra arte e tecnologia, affrontandolo con sfumature differenti». Una sfida che prende forma in un museo tradizionale, dove progetti sperimentali come questo solitamente non mettono piede: «Il Mata – spiega Panaro – è uno spazio complicato, pieno di opere, una quadreria. Invece in Effimera le opere sono poche, non si vedono. Gli unici elementi esposti sono strumentali al loro funzionamento. La cosa interessante è però che le persone possono passarci anche ore. Ogni opera è immersiva, ci

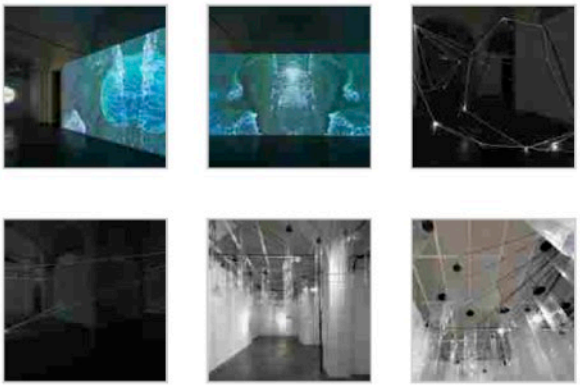
entri dentro, te la godi in tutta la sua spazialità».



Il percorso comincia in piena luce con l'installazione sonora di Pugliese, poi passa agli affreschi digitali di Ciracì e si conclude con il lavoro più estremo, quello di Bernardini, disegni di luce nel buio totale. Nelle stanze del Mata non vengono però mostrati solo tre lavori diversi ma tre generazioni differenti e distinti approcci alla tecnologia. «In questa edizione – sottolinea Chimento – ci sono trent'anni di sperimentazione sui nuovi media dagli anni Sessanta rappresentati da Bernardini, fino agli Ottanta con Pugliese passando per i Settanta di Ciracì». Proprio quest'ultima, in occasione di *Effimera*, presenta un lavoro inedito mentre Bernardini piega e compone le sue luminose fibre ottiche in un site specific realizzato per lo spazio del museo e infine Pugliese riadatta all'ambiente un suo lavoro, *Emergenze acustiche*, già presentato nel 2013. Completamento del percorso espositivo è il catalogo: «Un'opera a sé – conferma Panaro – a cui teniamo particolarmente. La pubblicazione – continua – è anche una scusa per presentare l'artista con una piccola retrospettiva inserendo fra le pagine anche lavori non in mostra». A realizzare il catalogo 2017, per il secondo anno, è un artista della scorsa edizione, Carlo Zanni, che divide la pubblicazione in due parti, una testuale e l'altra iconografica. «L'idea – dice Panaro – è quella di una collana che possa dar seguito alla mostra e costruirsi come un approfondimento sulla new media art». A questo si aggiunge un fitto calendario d'incontri in cui, tra gli ospiti, anche il direttore del centro Pecci Fabio Cavalucci e il filosofo Tommaso Tuppini.

*Effimera*, infatti, è concepito come un progetto che cerca di uscire dai confini della singola mostra, verso altre città e, perché no, piattaforme anche web, per portare avanti un'indagine sul rapporto tra arte e tecnologia, un legame destinato a evolversi continuamente. «Già prima di iniziare il percorso – spiega Panaro – lo pensavamo a tappe». L'idea è quella di realizzare un appuntamento annuale consolidando un'identità che si è andata definendo negli ultimi due anni, identità espressa anche nel logo, due F che, semplicemente affiancate, ricordano zampe e ali di un insetto, l'Ephemera: «non è un caso – conclude Chimento – che il nome Effimera ricordi quello di un insetto la cui vita dura soltanto un'ora e mezzo».

Dal 18 marzo al 7 maggio; Mata, via della Manifattura dei Tabacchi 83, Modena; info: www.mata.modena.it



artist Roberto Pugliese, mentre l'approdo si identifica nelle installazioni luminose in fibra ottica di Carlo Bernardini, dipanando il percorso fra le immagini fluttuanti degli affreschi digitali di Sarah Ciracì. *Foto in alto: Carlo Bernardini, Oltrelimite, 2017, fibra ottica.*

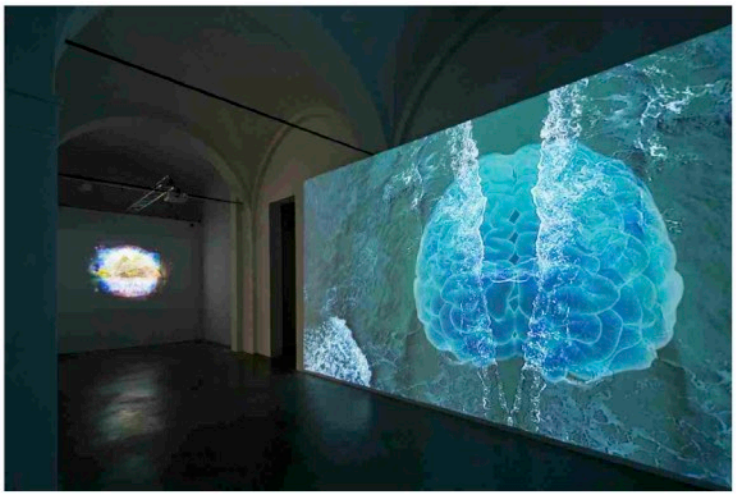


*Foto in alto: Sarah Ciracì, Like An Ocean With Its Waves..., 2017, video installazione.* Un percorso spiccatamente immersivo, ideato e strutturato appositamente sul MATA: tre imponenti installazioni ambientali, separate ma contigue, marcano una distinzione linguistica e temporale, e al tempo stesso suggeriscono una linea di continuità all'interno del percorso evolutivo dell'arte. Per rimarcare le distinte peculiarità d'approccio i curatori hanno coinvolto artisti appartenenti a tre generazioni differenti, nati rispettivamente negli anni Sessanta, Settanta e Ottanta, che riflettono altrettanti modi di intendere l'interazione tra arte e tecnologia.

***dove:*** MATA, *Via della Manifattura dei Tabacchi, 83 Modena*
***quando:*** dal 18 marzo al 7 maggio

Parole chiave: eventi d'arte contemporanea

16 marzo 2017

ARTICOLO PRECEDENTE
**David il grande**

Il Pensiero Artistico
Magazine di Arte e Attualità – Direttore: Stefano Boninsegna



# EFFIMERA – Suoni, luci, visioni

marzo 15, 2017 Redazione Arte Terza

**Inaugura sabato 18 marzo alle ore 18.00 al MATA di Modena una nuova edizione di Effimera – Suoni, luci, visioni, a cura di Fulvio Chimento e Luca Panaro e in collaborazione con la Galleria Civica di Modena, che quest'anno propone opere di Carlo Bernardini, Sarah Ciracì e Roberto Pugliese. La mostra è realizzata con il supporto di Coptip e del Gruppo Fotografico Grandangolo BFI.**

*Ufficio stampa Pomilio Blumm*

Effimera giunge dunque alla sua seconda edizione, coerente con l'intento dichiarato dai suoi curatori già nel 2016: individuare e valorizzare artisti, preferibilmente italiani e con esperienza all'estero, che fanno dell'utilizzo avanzato della tecnologia la cifra stilistica del proprio lavoro. Un evento espositivo che si propone quale indagine critica in relazione alle ultime tendenze artistiche caratterizzate dai "Nuovi Media", momento di crescita e di aggregazione a livello nazionale intorno a parole chiave quali arte, tecnologia e comunicazione.

Nel 2016 Effimera aveva individuato il suo punto focale nel web, inteso come strumento di conoscenza artistica e relazionale grazie alla presenza degli artisti Eva e Franco Mattes, Carlo Zanni e Diego Zuelli. La nuova edizione si concentra sull'analisi della componente immateriale che è caratteristica della ricerca artistica dei nostri giorni, che trova trasposizione (e sintesi) all'interno di un percorso espositivo che prevede la creazione di un viaggio sensoriale interno alle tendenze artistiche recenti.

Nel 2017 i curatori hanno dunque strutturato i 500 mq del MATA in tre ambienti distinti. Punto di partenza di questo "attraversamento" è costituito dalla ricerca sonora del sound artist Roberto Pugliese, mentre l'approdo si identifica nelle installazioni luminose in fibra ottica di Carlo Bernardini, dipanando il percorso fra le immagini fluttuanti degli affreschi digitali di Sarah Ciracì.

Effimera – Suoni, luci, visioni è costruita intorno a un percorso spiccatamente immersivo, ideato e strutturato appositamente sul MATA: tre imponenti installazioni ambientali, separate ma contigue, marcano una distinzione linguistica e temporale, e al tempo stesso suggeriscono una linea di continuità all'interno del percorso evolutivo dell'arte. Arte intesa come esperienza totale e totalizzante, in grado di stimolare l'intelletto, ma anche di innescare un corto circuito a livello sensoriale.

Per rimarcare le distinte peculiarità d'approccio i curatori hanno coinvolto artisti appartenenti a tre generazioni differenti, nati rispettivamente negli anni Sessanta, Settanta e Ottanta, che riflettono altrettanti modi di intendere l'interazione tra arte e tecnologia. Il fil rouge che contraddistingue Effimera è sempre rappresentato dall'intento di indagare l'arte attraverso le sue componenti immateriali, al fine di far luce sullo statuto attuale dell'opera. I lavori degli artisti di ultima generazione, infatti, si caratterizzano per la spiccata componente effimera legata al procedimento artistico che rispecchia l'epoca nella quale viviamo. Non a caso il nome della rassegna si ispira anche a quello della specie animale che ha vita più breve sulla terra, l'Ephemera, un piccolo insetto acquatico (simile a una libellula) la cui esistenza dura all'incirca un'ora e mezza. Altro assioma fondante di Effimera è il constatare come l'unicità dell'opera non sia più un assunto dell'uomo contemporaneo: grazie alle tecnologie di cui disponiamo, ogni copia è riproducibile con la medesima qualità, e quindi è sempre potenzialmente identica all'originale.

Fa da corredo a Effimera un ricco calendario di incontri collaterali che prevede la presenza degli artisti coinvolti, ma anche di filosofi ed di esperti del settore "arte e tecnologia".

**MATA, via della Manifattura dei Tabacchi 83, Modena**

**a cura di Fulvio Chimento e Luca Panaro**

**periodo 18 marzo – 7 maggio 2017**
**inaugurazione 18 marzo ore 18**

**apertura alla stampa 16 marzo ore 11.30 (a seguire visita alla mostra con i curatori)**

*in collaborazione con*
*Comune di Modena e Galleria Civica di Modena*
*con il sostegno di*

Dal 15 al 30 marzo, in concomitanza con l'attesissima mostra di Kandinskij, il Bistrot del MUDEC – Museo delle Culture di Milano – accoglie una preziosa selezione di scatti del fotografo italiano Enzo Pellegrini, a cura di CalliopeA...

**Il fotografo Enzo Pellegrini al Mudec di Milano**

Da venerdì 10 marzo prossimo, ore 18.30, fino al 10 aprile 2017, a Cosenza, all'interno dello spazio del Museo delle Arti e dei Mestieri (MAM), si terrà la mostra collettiva Mater Terra. Silvio Rubens Vivone L'esposizione, nata da un progetto di Fran...

**Mater Terra**

Inaugura sabato 18 marzo alle ore 18.00 al MATA di Modena una nuova edizione di Effimera – Suoni, luci, visioni, a cura di Fulvio Chimento e Luca Panaro e in collaborazione con la Galleria Civica di Modena, che quest'anno propone opere d...

**EFFIMERA – Suoni, luci, visioni**

Un mondo dentro la matita di un design. Un mondo che trabocca di creatività e diventa forma perfetta, grazie al lavoro di sapienti artigiani. Nasce così la mostra "Mondocleto. Il design di Cleto Munari" che si terrà dal 18 marzo al 10 giugno a Palazz...

**Mondocleto. Il design di Cleto Munari**

ARTE.it
THE MAP OF ART IN ITALY
mercoledì 15 marzo 2017





# EFFIMERA - SUONI, LUCI, VISIONI



Sarah Ciracì, Like an ocean with its waves, 2017

**Dal 18 Marzo 2017 al 07 Maggio 2017**

MODENA

LUOGO: MATA di Modena

CURATORI: Fulvio Chimento, Luca Panaro

ENTI PROMOTORI:
Comune di Modena
Galleria Civica di Modena

COSTO DEL BIGLIETTO: ingresso gratuito

TELEFONO PER INFORMAZIONI: +39 059 4270657

E-MAIL INFO: mata@comune.modena.it

SITO UFFICIALE: http://www.mata.modena.it/

COMUNICATO STAMPA:
Inaugura **sabato 18 marzo** alle ore **18.00** al **MATA di Modena** una nuova edizione di ***Effimera – Suoni, luci, visioni***, a cura di **Fulvio Chimento** e **Luca Panaro** e in collaborazione con la **Galleria Civica di Modena**, che quest'anno propone opere di **Carlo Bernardini**, **Sarah Ciracì** e **Roberto Pugliese**. La mostra è realizzata con il supporto di Coptip e del Gruppo Fotografico Grandangolo BFI.

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**stilistica del proprio lavoro**. Un evento espositivo che si propone quale indagine critica in relazione alle ultime tendenze artistiche caratterizzate dai "Nuovi Media", momento di crescita e di aggregazione a livello nazionale intorno a parole chiave quali arte, tecnologia e comunicazione.

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SCARICA IL COMUNICATO IN PDF

*ROBERTO PUGLIESE · SARAH CIRAC · CARLO BERNARDINI · MATA DI MODENA*



Dal 11 marzo 2017 al 11 giugno 2017
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