

Gilles Massot

The White Space Conflict Theory: Understanding Photography as Energy

Abstract: *The three essays that form part of this trilogy all hold that the full implications of the emergence of photography in human society and, in particular, in physical reality, are yet to be understood. Speaking in three voices, the trilogy ponders the nature of photography from the points of view of art history, physics, and art. Historian of photography Gaston Gabriel Marceau explores the connections between the different histories of photography and quantum mechanics. He suggests that photography is energy. Chinese physicist Professor Ma develops this proposition further with the aid of the white space theory and the concept of “duplicord” which refers to the action of the recording apparatus, the camera or the phonograph. In the last essay, Malay artist Gila Masok sounds an urgent Open Call to Open-minded Scientists designating a possible path of joint art-and-science investigations of a phenomenon at the heart of the more recent “duplicord” developments such as big data.*

Foreword: On the origin of the name

There is a time for planting, a time for harvesting, and a time to return to the soil, fertilize it, and nurture the growth of a new seed that propels the cycle of never-ending transformations of which the narrative of life is woven. If the time has come for this essay to fertilize the soil, so to speak, then the seed in question is my 1977 mixed-media work *Time Frame* that explored the relationship of painting and photography to representations of time and space.¹ *Time Frame* was my first intentional attempt to move beyond the appearance of photography; it was a meditation on photography’s intrinsic nature that has, since then, fueled artistic and intellectual explorations and has, in turn, been fueled by constant travel and many serendipitous meetings with congenial personalities, such as the

¹ Gilles Massot, “The Formative Years” (2017), *Gilles Massot* <<https://www.gillesmassot.com/1970s-formative-years.html>> (acc. 15 March 2019).

See the fourth window: the turning point of artistic practice, summer 1977, the beginning of a journey of exploration into the overlapping of time-space in painting, photography and performance.

Malay artist Gila Masok. Heated debates about Masok's painterly experimentations with photography led to our 1991 collaboration on the *Coffee Shop* exhibition.² By 2004 a professional engagement provided the context for *Time Frame* to develop beyond my initial intentions and transform into a concept: the Constant Self-Recording Mode aka COS•MO. As a concept, COS•MO generated talks, exhibitions,³ and a dynamic exchange of information across practices and Internet platforms that attracted the attention of a French historian of photography and a Chinese physicist. Studying the until-then overlooked connections between the respective histories of photography and quantum mechanics, the historian of photography Gaston Gabriel Marceau,⁴ furnished COS•MO with insightful historical explications. Professor Ma,⁵ for his part, articulated the concept in the form of a speculative mathematical equation, which, as he once casually mentioned, is influenced by his previous incarnation as a Taoist master. For several years, this unexpected burgeoning of ideas continued to ripen in the heat of intense on-line conversations until, one day, it culminated in a videoconference. The videoconference – a harvest of sorts – was spurred by a strange occurrence. In an attempt to create a cloud folder and leave the folder “untitled” since the theory we were developing had yet to be named, the folder automatically took on the name “White Space Conflict.” It appears that items placed in the cloud cannot be left “untitled.” They have to have identity, a name or a number so as not to dissolve into anonymous virtual infinity. The accidental poetics of this name echoed the fate of photography's third dimension – depth – that materializes eternal photographic stillness and is the reason why the present engagement with the above-mentioned questions bears the name *White Space Theory*, a space identified as a virtual repository for the residue of the entropy generated by photographic recording, or rather “duplicording,” to use Professor Ma's term.

² Gilles Massot, “Coffee Shop” (2017), *Gilles Massot* <<https://www.gillesmassot.com/1992-coffee-shop.html>> (acc. 15 March 2019). The name Gila Masok, which makes my name sound like *gila masuk* or “crazy entry” in Malay, was given to me as a friendly nickname in the early 1980s. It became one of the four alter egos used in the 1991 exhibition *Coffee Shop*.

³ Gilles Massot, “COS•MO” (2017), *Gilles Massot* <<https://www.gillesmassot.com/2013-cosbullmo.html>> (acc. 15 March 2019). The exhibition COS•MO was presented in October 2013 at the Institute of Contemporary Art Singapore. It gathered the works of twenty-nine artists who gave their interpretations of the concept through a wide range of media.

⁴ The alter ego Gaston Gabriel Marceau was specifically created for this essay to balance the already existing two, Professor Ma and Gila Masok.

⁵ This alter ego was first created in 1988 for a series of lecture-performances.

From chiaroscuro to the collapse of the wave function or beyond image making (*Gaston Gabriel Marceau*)

The quest for the world's representation as experienced through the sense of sight is ancient and universal. However, fifteenth-century European Renaissance saw the concomitant development of two revolutionary pictorial techniques that crystallized the concept of an idealized realistic image. This new image departed from graphic stylization that had dominated the visual arts since the cave paintings. In drawing, perspective systematized the image with the aid of geometry as perceived by a single observer resulting in a sense of depth that had been absent until then.⁶ In painting, the *chiaroscuro*, based on the study of light and contrasting shadows, convincingly rendered a sense of volume.⁷ Both techniques allowed the artist to produce credible transcriptions of four-dimensional perceptions into two-dimensional representations. These sensorial manipulations were so effective in their imitation of physiological vision that they came to define the European aesthetic standards for the next four centuries. When used together, perspective drawing or painting and *chiaroscuro* imitated the image projected in the camera obscura almost to perfection. But the “almost” was unsettling. It called for an obsessive search for a flawless mirror image of the world that found its incarnation in the invention of photography in the nineteenth century. The art and photography historian Geoffrey Batchen suggests that at the turn of the nineteenth century the world was obsessed with a “burning desire” to photograph.⁸ All of a sudden,

6 The publication of the painting treatise *Della Pittura* by the Genoese artist Baptista Alberti in 1435, followed by its Latin version *De Pictura* in 1439–1441 is regarded as instrumental in the development of perspective as a means to achieve the realistic graphic representation of landscape and architecture through geometry and the laws of optics. See *On Painting A New Translation and Critical Edition*, ed. Leon Battista Alberti (New York: Cambridge UP, 2011).

7 Chiaroscuro developed from a drawing technique. Artists worked from the paper's base tone towards light using white gouache or towards shadow using ink. While essential to what we are accustomed to call realism on account of its use of light and shadow, this technique should also be considered in relation to three other painting techniques of the Renaissance: *cangiante*, best represented by Michelangelo, who in the Sistine Chapel uses color tones to render highlights and shadows; *sfumato*, epitomized by Leonardo da Vinci's *Joconda*, and which smoothens the transition between colors to model light; and *unione*, developed by Raphael, which combines the contrast of *chiaroscuro* with the harmony of *sfumato*. See Marcia B. Hall, *Color and Technique in Renaissance Painting: Italy and the North* (Locust Valley, NY: J. J. Augustin, 1987).

8 Geoffrey Batchen, *Burning with Desire: the Conceptions of Photography* (Cambridge: MIT P, 1997): 35.

people felt the urge to fix the ephemeral image of the camera obscura. This image was nothing new in itself, nor was it complicated to produce. What was new was the urge to record the action of light to generate a physical trace of a moment in time, *the urge to stop time*.

Out of the political turmoil triggered by the French Revolution in the late eighteenth century emerged a society based on trade and industrialization. Its elite was no longer composed of landlords and aristocrats but of the bourgeoisie and businessmen who produced goods en masse and distributed them worldwide. The bourgeoisie and businessmen needed a representation of power that would differentiate them from past dignitaries while remaining respectful of the established social conventions. The image of the camera obscura reproduced by artists (that is, by hand) offered perfect realism; it was an apt vehicle for the conventions of portraiture, however, one ill attuned to the changing times. The portrait needed to be more immediate, more technical, more *now*. The *now* of the image on the camera's glass was a perfect solution. The rational classification of scientific knowledge inherited from the Enlightenment had made the preservation of this appearance possible by combining the latest experiments in optics and chemistry. The camera obscura had, in fact, been an old trick since the eleventh century.⁹ Its enduring magic lay in the image's life-like realism when projected on the viewing glass of a lightproof box, an uncomplicated procedure that reproduced the working of human vision. The appearance of the image could not be significantly improved. What could be improved, however, was the fixing of the image, which indicated a fundamental transition from a system of *coded representation* to the dynamic energy of spontaneous recording. The full implications of this transition, and its impact on the time-space continuum, are yet to be understood. For, regardless of photography's debt to science and technology, photography is rooted in the pinhole phenomenon, which has existed since the dawn of time in the eyes of countless living creatures equipped with ocular vision. Indeed, the pinhole phenomenon *is what makes the world look real for us*. However, it does no more than *make* the world *look* real. What we perceive as reality is only its *projection on the retina*, an abstraction created by light: an image,¹⁰ a sensorial illusion our acculturated self takes for objective reality. Indeed, as Plato's allegory of the cave has reminded us since the fourth century BCE, there is

⁹ It was first conceptualized and constructed by the Persian scientist Al Hazen in eleventh century Bagdad, based on his observation and understanding of physiological vision.

¹⁰ An amusing contemporary example of this observation can be found in the viral discussion of the color of a dress that took the web by storm on February 26, 2015. Wikipedia (last edited 12 March 2019), *The dress*, <https://en.wikipedia.org/wiki/The_dress> (acc. 15 March 2019).

nothing more to *reality* than our perception of it.¹¹ But the sudden urge to record the image produced by the pinhole phenomenon was much more than a technological advancement. Turning the pinhole image into a *concrete object* was nothing short of initiating an irreversible process in which the quintessential transience of life became a finished physical object. Otherwise put, the photograph turned impermanence into irreversibility. It created a new form of energy that, from then on, interacted with the physical world.

To fully understand the phenomenological gap that differentiates a photograph from a painting, a comparison is needed with the change of paradigm that took place in the auditory realm, more specifically, Thomas Alva Edison's 1877 invention of the phonograph. Before the appearance of this sonic recording device, it was not possible to hear sounds from the past.¹² The only way to preserve sound was through notation, text or musical partition.¹³ With the phonograph, a sound heard once could be heard again and again, anywhere, at any time. It could be reproduced independently of its past existence. Most importantly perhaps, human voice was dissociated from the physical organ that had produced it and could exist in another time and space, as an independent entity, which afforded a form of self-observation with no former equivalent. The revolution generated by audio recording needs to be brought into the visual realm to adequately evaluate the fundamental nature of painting and photography. From a phenomenological perspective, these two forms of visualization are the "before" and "after" of a threshold that should be regarded as the birth of modernity because it initiated our contemporary perception of time and space.¹⁴

11 Plato, Book VII of *The Republic*, trans. Sir Desmond Lee (London: Penguin, 1955).

12 With the limited exception of the still ephemeral and site-specific phenomenon of echo.

13 One telling example of this sheer impossibility of reproducing the actual sonic experience is found in the story of Hercule Florence who in 1824 was recruited as a visual artist for the Langdorff mission. Tasked with documenting the flora and fauna observed in the course of the exploration of the Amazonian basin, Florence developed a system of written annotation that allowed the transcription of tunes and sounds produced by birds and other exotic forest animals. Florence is also one of the many inventors of photography of the early nineteenth century. He is known to have used the word *photographie* to describe his invention in his journal as early as 1833, six years before the better known word used by Herschel. *Hercule Florence, le Nouveau Robinson*, catalogue of the exhibition curated by Linda Fregni Nagler and Cristiano Raimondi (Monaco: Nouveau Musée National de Monaco and Humboldt Book, 2017).

14 Announced in Paris in August 1839, the daguerreotype had crossed the Atlantic one month later, was sold in Calcutta in 1840, and in Sydney in 1841. Within just a few years, the famed "likeness" had become an ordinary occurrence and a calotype portfolio allowed to visit the world from the comfort of a drawing room. Electricity is related to multiple inventions contemporaneous with the development of photography, such as Michael Faraday's electric motor in

Ferdinand Niepce's 1826–1827 *Point of View at le Gras* is widely acknowledged as the earliest known image imprinted by light and thus the ancestor of photography. Initially, this new pictorial medium was cumbersome and rarely used. However, through constant technical improvements, it became ubiquitous in less than a century.¹⁵ This evolution gave rise to a civilization based largely on the production and consumption of images in their various forms. Yet, in the context of today's information society, the process of light recording, triggered by photography and extended in and by photography's multiple applications, is largely taken for granted. A thick veil of oblivion hides the metaphysical mystery at the heart of the transmutation of time-space into an image. In the contemporary world of fake news and ubiquitous photographic manipulation, it is arresting to consider how the medium that first made the transient physical is making the real virtual. It would appear that with the magic wand of technology, science dissipated the fog of subjectivity that supposedly clouded artistic expression. "The camera cannot lie"¹⁶ was a widely shared assumption that found its justification in the detailed sharpness of the daguerreotype. Although not as crisp as the daguerreotype, the calotype allowed unlimited reproduction of the original. However, the world had entered the "Age of Mechanical Reproduction,"¹⁷ and the resulting sense of prevailing *objectivity* reframed the contentious question of visual representation with assertive impartiality. Or so it seemed. For, in truth, today we know that photography has done nothing but *blur* the boundaries between "truth" and "fiction." In the history of photography, the event that most aptly substantiates this claim was Hippolyte Bayard's 1840 *Self-portrait as a Drowned Man*, the first photographic fake that Bayard had created in protest against the rejection of his invention in

1821 or Georg Ohm's electric circuit in 1827. But it was not until 1882 that electricity penetrated everyday life with Edison's Electric Illuminating Company of New York.

15 Some of the most decisive steps marking this evolution can be identified as the Kodak camera and its slogan "Press the button we do the rest" in 1888, the halftone reproduction technique that allowed the printing of photographs in daily newspapers by 1873, the development of magnetic images with video in 1951, and the first digital camera (Kodak) in 1975.

16 A widely accepted trope that it is even labeled as a proverb on the Internet. Writing for the *Quarterly Review* in 1864, Robert Cecil (1830–1903) "summed up the general feeling. *It is to science... that photography, the child of science, renders, and will unceasingly render, the most valuable aid... Photography is never imaginative, and is never in any danger of arranging its records by the light of preconceived theory.*" Mary Warner Marien, *Photography a Cultural History*, third ed. (New York: Pearson, 2010): 160.

17 The term was coined by the philosopher Walter Benjamin as a title for his seminal essay in which he envisioned the political and cultural impact of possibly infinite mechanical reproduction, in particular the reproduction of artworks that (as he saw it) were losing the aura of originality and uniqueness. Walter Benjamin, *The Work of Art in the Age of Mechanical Reproduction* (Paris: Brodersen, 1936).

favor of Louis Daguerre's. Bayard's self-portrait is a seminal image in which fiction (the drowned man) was intentionally presented as reality. While celebrated in the history of photography, the full impact of this image has yet to be acknowledged, most importantly in the history of social ideas. The apparently innocent manipulation of time and space, through which photography effortlessly operates, turns reality into fascinating fiction. It also turns fiction into convincing reality, making each and every photograph an object of subjective perception. By the turn of the twentieth century, photography's inherent propensity for psychological manipulation was well understood by the fast-growing advertising industry. The highly subjective interpretative power of the image was intentionally used to increase the marginal utility of the product, as defined by the rapidly growing "science" of economics. Various ancient philosophical schools and cultural accounts had, since time immemorial, insisted that reality is no more than *subjective perception*¹⁸; indeed, one of the purposes of spiritual practice of any persuasion has always been to leave behind the sensorial desires that taint one's perception. Strangely enough, the twentieth-century marketing proved these theories right albeit through the materialization of their very antithesis.

An odd switch of dimensions occurs in the translation of matter and energy known as "taking a photograph". Ever since Albert Einstein's revolutionary equation,¹⁹ we know that time and space are but two sides of the same coin. Exactly the same is the case with photography. The dimensions of time and space react to each other through the combined actions of the lens, which channels space, and the shutter, which channels time. In a photograph, the information about the space and time of a situation carried by light collapses into a *finite* amount of energy, the recording of which we interpret as an image. Einstein's equation $E=MC^2$ can be said to mirror the photographic process if we suggest that: *Space/lens/M x Time/shutter/ C^2 = a finite amount of energy, the photograph as E*. The resulting finite piece of continuum here becomes detached from the context in which it hitherto existed. From the moment of its inception, the image continues to float in the world as a singular entity within the ongoing continuum, as if in a parallel dimension. If one uses the Online

18 In particular, the Asian schools of thought issued from Hinduism and Buddhism.

19 Published in the *Annalen der Physik* scientific journal in 1905, the equation $E=MC^2$ stated the equivalence of matter and energy. It is one of the four revolutionary papers known as the *Annus Mirabilis* papers published by Einstein at the age of 26. The famous equation however is not the one for which he received the Nobel Prize in Physics in 1921, a distinction awarded for his discovery of the law of the photoelectric effect.

Oxford dictionary definition,²⁰ the photograph can be seen as a *quantum of the continuum*: a discrete amount of energy proportional in magnitude (pictorial impact) to the frequency of the radiation it represents (the specific fragment of the continuum recorded). Lastly, one of the continuum's many possibilities is given a definite form through the collapse of the wave function: the capture of a decisive moment by the camera.

There are many parallels between the history/ies of photography and quantum mechanics. This is not unexpected given that their common origin is the study of light. The question of whether light is a particle or a wave was central to the chronology of experiments leading to the development of a new relationship to reality in the natural sciences, much like photography had done in the social world. This question began with Isaac Newton whose mechanistic vision of the world had led him to postulate that light was a particle, but who also observed the diffraction of white light into the color spectrum.²¹ A century later, this observation became the ground of Thomas Young's astute proposition that colors in physiological vision result from three different types of cells in the cornea, respectively sensitive to the green, red, and blue parts of the spectrum.²² Based on the observation of mechanistic water waves, in 1801 Young also elaborated the two-slit interference experiment that would play a decisive role in the study of the photon in the 1920s. The event in which the two histories entwine is the experiment conducted by James Clerk-Maxwell in 1860,²³ known as the Tartan Ribbon. Here, Clerk-Maxwell photographed a Scottish ribbon through three different color filters and recombined the three black and white images as a projection in which color appeared. This experiment demonstrated that light is, indeed, an electromagnetic field. At the same time, it established the three-color channels model as the basis for all color light-based images, from analogue photography to electronic screens and digital images. Forty years later, light and color were again brought together in Max Karl Ernst Ludwig Planck's experiment on the Black Body Radiation. This experiment established the paradoxical quantized form – or elementary unit – of electromagnetic energy. It also gave birth to the concept of

20 "Quantum," *English Oxford Living Dictionaries* <<https://en.oxforddictionaries.com/definition/quantum>> (acc. 8 October 2018).

21 Isaac Newton, *Opticks: or a treatise of the Reflections, Refractions, Inflections and Colours of Light*, fourth ed., (London: Printed for William Innys at the West End of St. Paul's Mdcxxx, 1730).

22 Thomas Young, *The Bakerian Lecture. On the theory of light and colours* (London: Phil. Trans. R. Soc. Lond., 1802).

23 The Tartan Ribbon experiment was presented to the Royal Institution for a lecture on color theory in 1861.

color temperature, now central to color photography. On May 29, 1919, two photographs of the total eclipse of the sun, taken in West Africa and Brazil respectively, formed part of the experiments and measurements that confirmed Einstein's claim that the sun's gravity bent light, a key implication of his *General Theory of Relativity*.²⁴ By physically substantiating Einstein's claim, the two photographs helped to turn a contested theory into a cornerstone of modern physics as well as make Einstein a public figure, when several months later, the news was published in *The New York Times*. Factual documentation by way of photographic recording has therefore been key to the developments in and of physics. John A. Wheeler best expresses the relation of photography to quantum mechanics in the following much-quoted passage:

In today's world, no elementary quantum phenomenon is a phenomenon until it is a registered phenomenon – that is indelibly recorded or brought to a close [...] by an irreversible act of amplification, such as the avalanche of electrons in a Geiger counter or *the blackening of a grain of photographic emulsion* or the click of a photo detector.²⁵

Wheeler's pragmatic observation is followed by a poetic metaphor about the nature of the photon, echoing the pictorial duality through which the photographic language manifests: "the photon is a great smoky dragon, its teeth sharp [...] its tail sharp [...] but in between totally smoky."²⁶ The smoky body of the photon-dragon is blurred while its tail and teeth are sharp. Sharp and blur are the two pictorial effects produced by the combined action of the lens and the shutter to register the time and space of the recorded scene. Sharp and blur, light and shadow, science and art, reality and fiction ... the medium works through dualities to capture the mirror image of a world manifesting as constant change: from day to night, from hot to cold, the world is a never-ending cycle of transformation from one extreme to its opposite. Regardless of how slow or small a change is, it is the transformation from one state to another that defines all physical existence. In fact, one could go as far as to say that things exist only as a *narrative of their transformation*.

Narratives are stories; they are also vehicles of information, a concept that became central to Wheeler's understanding of quantum mechanics. His conclusive reflections on the puzzling quantic nature of reality are found in *The World*

²⁴ Ian O'Neill, "How a Total Solar Eclipse Helped Prove Einstein Right About Relativity" (May 29, 2017), *Space.com*. <<https://www.space.com/37018-solar-eclipse-proved-einstein-relativity-right.html>> (acc. 17 October 2018).

²⁵ John Archibald Wheeler, "World as system self-synthesized by quantum networking," *IBM Journal of Research and Development* 32.1 (1988): 4–15, 10; emphasis mine.

²⁶ Wheeler, "World as system," 10.

as *System Self-synthesized by Quantum Networking* in which he expounded not quite a theory, as there was no equation to be tested, but a flow of ideas and insights centered on a reinterpretation of the observer's role in the double slits experiment. In a bold move, Wheeler first rejected the standard notion of particles as concrete building blocks of materiality and the concept of the continuum that had dominated physics until that time. Instead, he introduced "discreteness" that characterizes the quantum as an infinitely small but *finite* amount of energy. His rejection of the continuum also implied a radical reconsideration of the notion of time as non-relevant in the quantum world.²⁷ Wheeler discerned a clear information-theoretical character in the way the quantum can only exist as a yes- no entity, given that the possibility of a continuum between two states of existence has been eliminated.²⁸ Although quantifiable by a discrete number, the quantum has no other finite reality but the probabilities of the yes-no answers describing its state of existence. Wheeler infers that it is this information-theoretical character that is central to the quantum; *the world is made up primarily of information*, not of matter. As the probability of this information is actualized by observer-participancy, the physicality of the world is the result of the looping transfer of information between the observer and the thing observed, *a system self-synthesized by quantum networking*.

The emphasis on information was the third and final stage of Wheeler's scientific career. At first firmly grounded in concreteness, his motto was: "everything is particle." Mid-career saw Wheeler move towards disincarnated fluidity proclaiming that "everything is field." In the final stage, he concluded that "everything is information," an idea condensed into the striking formulation: "It from Bit." With this rhythmic word play, Wheeler summed up the idea of a physical world manifested through the transfer of bits of information, since information is actualized only when perceived and transferred. For Wheeler, the most essential transfer is a U-Theory diagram, where U stands for the universe. The diagram shows a capital U in which one of letter U's arms has an eye looking at the other arm, an eloquent visualization of manifestation through self-observation. This image was developed in the early 1990s, together with his participatory anthropic principle that raised the following fundamental question: can the universe exist if there is no consciousness observing it?

²⁷ In the conclusion, he says that "comprehending the why of the quantum" will require "a physic of total austerity" to "derive – without time – the essence of time." Wheeler, "World as system," 15.

²⁸ "However, despite this apparent continuum of everyday experience – the quantum teaches us – the world has at bottom an information-theoretic character." Wheeler, "World as system," 7.

The self-reflective consciousness of the photographic act reached a new peak in 2013 when the word “selfie” was declared “the word of the year.” This new form of photographic behavior in which people record their existence by holding their mobile phone at arm’s length eerily resembles Wheeler’s schema. Much more than a simple premonition, we see in the sudden universality of this everyday behavior a striking evolution of the fundamental nature of photography as *recording energy*, an immediate expression of the Constant Self-recording Mode and the global transfer of information produced by permanent recordings and distributed by self-synthesized quantum networking.²⁹ A closer inspection of photography’s earliest phase reveals many more connections between quantum mechanics and photography. Presented to the world on August 19, 1839 by François Arago at the Academy of Arts and Sciences Paris meeting, the daguerreotype was regarded as that which marked the entrance of photography on the world stage. The image was here embedded in the silver coating of a copper plate sensitized to light with iodine. The exposure of the plate in the camera produced a latent image, the highlights of which were developed with mercury fumes. The natural chromatic reaction of silver to light was central to the earliest experiments; however, all these experiments encountered the same problem: the negative image. By exposing the latent negative image to mercury, Daguerre made the miracle happen: the image turned positive. The daguerreotype is generally presented as a direct positive image, but this statement is only partially true. The daguerreotype is *both* positive *and* negative at the same time. The initial negative image remains embedded in the metal plate, even though its development with mercury vapors creates another version in which the dark area of the negative is reinstated to its original nature as highlights. The two versions, the positive and the negative, exist together on the plate *in a state of superimposition*.³⁰ It is the *gaze of the observer* that separates the two images from each other. The incidence of light between the plate and the retina makes either one or the other appear as dominant. The daguerreotype is therefore something that is two things at once. It becomes one thing or the other in the

29 Here we need to mention that Wheeler had been the tutor of Richard Feynman, famous for his study of Quantum Electro Dynamic that describes the interactions between the photon and electron. On the macro level, this is comparable to the reaction between light and matter. Many scientific explanations were applied to the photographic field of the time addressing topics that ranged from practical photography techniques to philosophical aspects of the image theory.

30 The state of superimposition is regarded as a characteristic of a particle in quantum mechanics. But a measurement of that quantum bit will elicit only one of the two possible outcomes, a mystery quantum mechanics terms the collapse of the wave function.

eyes of the observer, which echoes the description of the photon in the double slit experiment. Another important connection is the remarkable work of William Henry Fox Talbot, whose intellectual curiosity embraced mathematics, chemistry, astronomy, and botany as well as philology, philosophy, Assyriology, and art history.³¹ Yet Talbot is remembered for the invention of the calotype, a process that resolved the question of the negative image by making a positive contact print of the shot captured by the camera. His earliest 1835 experiments produced negative images on paper. Three years later, when the news of the daguerreotype led him to resume his research, he quickly perfected and patented the invention in 1840. Recent experiments in quantum mechanics have observed quantum-type behaviors not only at the infinitely small particle level but also at the much larger level of atoms and molecules. Significantly, the current change of scale in quantum observation is based on Talbot's research carried out between 1835 and 1840. In 1836, he described a phenomenon of self-imaging fractal patterns created by the diffraction of a monochromatic light through a grating producing sub images with ever decreasing size. Known as the Talbot Carpet, the study of these patterns was completed by Ernest Lau in 1948 with further diffraction experiments on white light known as the Lau effect. Both experiments were combined in 2002 to create the Talbot-Lau interferometer, a device that opened "a way towards the quantum interference of even larger molecules."³² Somewhere between his first visionary photographic experiments and the commercial release of their practical applications, Talbot had unknowingly planted the seed for the observation of quantum behavior at a macro level. This link between Talbot's observation and the quantum world can be seen as tenuous or coincidental from a rational perspective. But the striking parallel between the daguerreotype and the photon has to be more than just accidental. In today's world, cameras operate everywhere and all the time, fulfilling the need for a recording device in an endless list of situations ranging from daily life to quantum physics where the most advanced device is called the particle accelerator.³³ From Maxwell's Tartan Ribbon and the photographic emulsion that

31 Mirjam Brusius and Chitra Ramalingam, "William Henry Fox Talbot – Beyond Photography," *Beyond Photography*, (Yale Center for British Art and the Paul Mellon Centre for Studies in British Art, 2013): 1–20.

32 B. Brezger, L. Hackermüller, S. Uttenthaler, J. Petschinka, M. Arndt, and A. Zeilinger, "Matter-wave interferometer for large molecules," *Phys. Rev. Lett.* 88.10 (2002): 100404-1–100404-4.

33 "The most common way of measuring the beam size with synchrotron radiation is to directly image the extracted light using traditional optics and a camera." Steve Myers, "The Engineering Needed for Particle Physics," *Philosophical Transactions of the Royal Society A* (2012), vol. 370 (1973), 3887–3923, 3919.

materialized the puzzling behavior of the photon in the double slits experiments to the recording of particles' behavior in the subatomic world, photography's role in the development of quantum mechanics amounts to much more than an anecdote. The question is: at what point does a list of coincidences become long enough to evidence non-coincide? The emergence of photography initiated a recording process that took many forms. From the factual information presented thus far, it can be deduced that photography is a form of *energy in its own right*. Today, this recording energy can be found in much of the perceptible universe, mediated by an infinity of electronic devices. One could go as far as to say that photography heralded quantum mechanics, the deceiving simplicity of the former being the societal manifestation of an unfathomable subatomic complexity, the impossibility of which became the hallmark of the latter. Together, they have created a new world in which the physical experience of reality has been replaced by its intellectual perception. At a time when virtual reality is almost as widely present as physical reality, this unnoticed fact deserves attention.

The white space theory or towards a physics of mnemonics (*Professor Ma*)

Photography should be understood as marking the shift from the analogue mnemonic “object-based recording” process to the fluid mnemonic abstraction of “event recording” in the digital-virtual world. Object-based mnemonic recordings range from the pictorial marks in the cave to written archives and the organic embodiment of memory in fossils. They keep track of the planet's past by creating physical objects to manifest, activate and actualize memory. This organic process is most explicit in the way fossils become geological memory. With the object-based mnemonic recording, the thing that *exists* physically in the world becomes the memory of a thing that *existed*. Event recording operates in a very different way. First, it requires an apparatus to record the energies, whether electromagnetic or mechanical, through which events manifest. Event recording is thus fundamentally technological. And here is the catch: the apparatus doesn't “record” the event as an object. It makes a DUPLICATE of the forces that enable an event's coming into being. This duplicate might look like event itself but it is a temporal abstraction: *it is that which was*. The two *modi operandi* are radically different. Yet, they are designated by the same word. In the case of event recording, a duplicate is made, however, this duplicate is not a “copy” in the way a photocopied document is. What is duplicated is the time of the event and the visual configuration of energy that brought it into being. For

the purposes of differentiating between the two mnemonic processes, I propose the verb “to duplicord” to designate the action of the energy that memorizes things existing in a state of transience. The verb “record” should therefore, from now on, be used only to refer to physical mnemonic objects.

The first manifestation of duplicording was photography. The medium expresses the continuum as a gamut of grey, ranging from absolute shadow, that is Zero, to absolute light, which is One.³⁴ It reproduces the intensity of light in a systematic and neutral manner. The original event’s data is compressed into a virtual document,³⁵ a condensate of information stored in the white space, ready to be shared and distributed. Not all forms of duplicording work in the same way nor do they store information in the white space in the same manner. For example, the two earliest forms of duplicording differ in the way they reproduce/interpret the continuum. Sonic duplicording implies a chronological reproduction of a sequence of sounds if they are to be re-experienced in the same way. This form of duplicording extracts a piece of the unfolding continuum, Zero for limitlessness, and reproduces it as a new finite continuum, One for a quantifiable amount. In doing so, it preserves something of the original value of the fourth dimension that is time while emphasizing the third dimension of depth through which sound is experienced. By contrast, photographic duplicording produces One as a *finished quantifiable amount* of the original event by freezing the continuum in the form of visual stillness that has width and height. However, this operation is the result of a puzzling transmutation of dimensions, a “zero” that sees the depth of the original event transferred to the time of the ensuing document. The transmutation of an event into a finite visual duplicording can be described with the following axiom:

The space of a photograph exists in the depth of its time

$$(x, y, z, t) = (x, y)/t^{\circ}$$

The vast difference observed in the ways sonic and visual duplicordings transcribe events and store them in the white space is indicative of the amount of work that has to be undertaken on a fully developed physics of mnemonics. As a

³⁴ This association is not written in stone. If one is to consider the situation from the perspective of materiality, 100% Black could be perceived as One and 0% black, that is white, as Zero.

³⁵ Even before the development of digital photography, the quintessential nature of a photograph recorded as a latent image on analogue film can be said to present a virtual quality in the way the potentiality of the image is already there although the image is yet to be physically developed to properly exist.

fundamental virtual dimension, white space exists out of time, independently of any physical manifestation. It includes all forms of duplicorded mnemonic data that were virtually present at the birth of the universe.³⁶ However, the probability of its indexing was realized with the first duplicording, which happened to be photographic,³⁷ at least in the case of planet Earth.³⁸ And it is the switch of dimensions – depth and time – that makes the stillness of photographic duplication into the puzzling phenomenon that it is. We can infer from this observation that the study of the transfer of dimensions will be central to the future development of this emerging branch of physics. As a step towards a possible physics of mnemonics, I will focus on the relation between the photographic medium and the white space. When we understand photography as energy, we come to the conclusion that the photograph is the quantum manifesting the medium's action on the physical world. By seeing the photograph as a *quantum* and not as an image, we change the conceptual perspective, which leads to the following thought: Photographic duplicording is a form of energy that extracts virtual mnemonic duplicates of the time-space continuum and stores them in the white space. The resulting quantum information operates as a force; it acts on the observer who for the purpose of the calculus is given the structure of a matrix hosting the transmutation of information across its constituting layers: sensation, memory, imagination and, finally, identity. The dimension hosting these matrixes is known as Semogid, an anagram combining the layers' names. The working of this force is similar to gravity's curvature that acts on the time-space of physical bodies, only in the abstract dimension of information. Identity at the heart of Semogid responds with the increase or decrease of the duplicording information stored in the photographic quantum. This exchange keeps the white space and Semogid looping into one another, as a self-synthesized quantum networking in which the transfer of information makes both (co)exist.

Clearly, the transfer of information through photographic duplicording has played a crucial role in the development of today's world. One could even say: *no duplicording = no modern science*. By fostering unlimited multiplication and distribution, photographic duplicording made information into the defining element of

36 A question to consider is whether this should apply to a planet, to a universe or to all universes at once.

37 The early phase of existence of this energy necessitated analogue supports, but its virtual output was expressed in an appropriate technology. In fact, it can be argued that it triggered the development of that technology.

38 Whether the course of events surrounding the emergence of the duplicording energy is specific to planet Earth or forms part of any planetary system's evolution is a question worth considering.

the future, a future in which quantum mechanics questions the materiality of any given “thing” that “is.” It replaces any given “thing” with information about the probability of its existence as a Zero or a One. From social media entertainment to rigorous scientific analysis, information has become the central preoccupation of the social world. The aspects and impacts by which it shapes today’s reality are, in the twenty-first century, studied by the Philosophy of Information, a new field in the Humanities. Information became a subject of theoretical studies only after World War II. Although the root of the word – “form” – is related to Plato’s Theory of Forms, the exact meaning of the term varies greatly according to the historical, cultural, and geographical context in which it is used. The meticulous collection of all potentially interesting information to the imperial government is known as a key characteristic of the Chinese civilization since the Shang Dynasty (1600–1046 BCE). Here, information was assembled in the form of chronicles, a factual listing of events and their descriptions.³⁹ Some of these chronicles were literary works in which fact recording was underlined by an ontological concern for the Laws of Change as dictated by Heaven.⁴⁰ Certainly the most famous of all Chinese books is the *Yijing* or *Classic of Changes* where the reality-regulating patterns are associated with the hexagrams of a divination manual.⁴¹ Their interaction is explained in the commentaries describing the order of the world as a result of constant change. Turned into a practical divinatory tool, this body of timeless “information” contributes to the shaping of the human position in the world in an active way. It does not merely say something about it. This ancient function of information echoes the nature of information used or produced in a scientific

39 One such prominent work is the *Shiji* (*Records of the Grand Historian*, 史記) written by Sima Qian (c.145–87 BCE). It covers the period from the time of Yellow Emperor until the author’s own lifetime.

40 One such work is the *Chronicles of Zuo*, ascribed to Zuo Qiuming, a contemporary of Confucius. In this record of occurrences of the Spring and Autumn Period (771–468 BCE), the comments on the reigns of various Marquis and Dukes are explained through the dynamic interpretation of information pertaining to the five elements and the fundamental laws regulating their interaction.

41 The *Yijing* comprise of two parts, the divination manual known as *YI* (*Changes*) and a set of seven commentaries compiled under the title *Classic of Changes*, out of which the *Dazhuan* or *Great Commentary* is the most important. However central to Chinese culture this book might be there is no clear indication of the date of its composition, or the identity of the author (or authors). It is estimated to be older than 168 BCE.

All information concerning Chinese history taken from: Internet Encyclopedia of Philosophy, *Chinese Philosophy: Overview of Topics* <<https://www.iep.utm.edu/chin-ovr/#SSH1a1i>> (acc. 27 November 2018).

context. From ancient Greece to this day science has used a simpler definition of information than the one generally associated with the photographic image. The scientific definition of information is not concerned with life's distractions; it focuses on what information *does* rather than on what it *says*. Ancient Greeks "suggested that the information content of an event somehow depends only on how probable this event is."⁴² Thanks to the multifaceted implications of Claude Shannon's information theory,⁴³ a contemporary scientific definition of information can be expressed thus: "Information is a measure of how surprising something is. Unlikely, low probability events contain a high degree of information. Likewise, high probability events contain very little information."⁴⁴

In other words, the more unexpected an event is, the more information it contains; but what happens to information's duplicording as a photograph? My proposition is that the same definition applies. The more unexpected an event is (in its manifestation), the more unique the recording (in its pictorial quality), the more information the final pictorial quantum contains. It follows that the stronger the energy/information coming from the white space, the stronger the curvature exerted on the continuum, which creates a deeper intersection with Semogid, a deeper penetration into the virtual, and a stronger imprint on the inner levels of the matrix (*emotion* on the outer layer, *memory* in the middle, *imagination* at a deeper level), to finally reach its full amalgamation in and as *identity*. The amount of information generated by the pictorial quantum – the quantification of its energy – is designated as *IP* (Identity probability), an indication of the fact that the energy produced by duplicording contributes to the development of identity at the core of the matrix. The higher the combined energies of the event and duplicording the greater the visual quantum's propensity to iconicity. The extent to which this quality interacts with identity can be quantified on a scale ranging from individual to universal. The following equation quantifies the ways in which the white space interacts with Semogid:

When quantified as information, an event's energy is the inverse of the probability of its taking place: the higher the probability the lower the energy. This value is identified as uX .

⁴² Vlatko Vedral, *Decoding Reality, The Universe as Quantum Information* (Oxford: Oxford UP, 2010): 28.

⁴³ Shannon's Information Theory was born out of research exploring the most efficient mode of information transfer via telephone lines carried out in the late 1940s at the world-renowned Bell Laboratories, New Jersey. It was formalized in the landmark paper "A Mathematical Theory of Communication," *The Bell System Technical Journal* 27 (1948): 379–473.

⁴⁴ Vlatko Vedral, *Decoding Reality*, 36.

When quantified as information the energy of the resulting duplicording will be the expression of its level of pictorial uniqueness: the more unique the image in relation to pictorial history, the higher the energy. This value is identified as uN .

However, duplicording and distribution of the event in pictorial form are subject to external influences. The impact of the cultural and social contexts is reflected in two variables. The first one, identified as a , accounts for the initial aura of the event, in other words, how known the event already is independently of duplicording, and quantified according to the number of individuals who are aware of its content prior to the recording. As this number constantly fluctuates, it should be a mean average taken over a certain period of time. Obviously, the greater the aura, the more likely is the probability of a wider distribution due to the societal fascination with fame, with no direct relation to the event's actual importance (or amount of information). An effective measurement of the pictorial quantum energy should not be a reflection of any pre-existing effect caused by the already existing aura. Therefore a is used as an inverse proportion of uX and uN . The second, identified as d , will take into account the effect of the dissemination of the image in the public sphere. It will be quantified by the number of individuals it can reach over a certain period of time.

These values come together in the following equation:

$$Ip = \frac{(uX \cdot uN)d}{a}$$

in which:

Ip is the amount of energy/information produced by the duplicording and impacting Identity

uX is the statistical probability of the event

uN is the comparative uniqueness of the pictorial quality of the quantum, commonly designated as a photograph

a is a variable taking into account the effect of the initial aura of the event (or subject), prior to its recording

d is the probable amplitude of the dissemination of this quantum in the public sphere.

A practical use of these values can only be achieved as a result of a tremendous amount of data computation that will quantify the probability of the event, the status of the image with regard to global pictorial history, and the number of individuals before and after duplicording. It is hoped that the promises of quantum computation will see the power of the qubit fulfill the calculations and measurements needed to put this theory to test.

An open call to open minded scientists (*Gila Masok*)

I never believed in the so-called veracity of photography. My father was a man of principles who considered it essential for the standing of our family to periodically update the image of our familial unity with a new photograph composed around the aura of his benevolent authority. Emotional life at home was much more conflicted than the photographs (that continued to replace one another above the living room sofa as the years went by) would lead one to believe. I intuitively sensed at a very early age that there was a lot more to a photograph than the self-absorbed air of certainty floating on its surface. This understanding gradually led me to painting, as I wanted to disrupt the sense of assurance or belief in the reality created by the illusion of the photographic image. A photograph exists only as a probability. The veracity of that probability is necessarily different for each and every observer. After years of exploration, I have come to the conclusion that the essence of the photographic enigma boils down to the following factors:

- Time and space are but a construct of the mind, necessary but ill-suited quantifiers of a transformation eternally at work in the world
- Transformation is the primary cause of time, not its effect. It is an energy that generates and sustains (the narrative of) life
- Life is therefore a narrative as are all physical things within it
- Photography is the first manifestation of another energy “in time”: the duplicording energy (as termed by Professor Ma)
- Duplicording, too, is concerned with the narrative, albeit in a way that differs from transformation
- Duplicording freezes the narrative of life into eternal virtual stillness
- One can also say that in each and every photograph the expansion of the universe has come to a standstill or: in the camera the speed of light is brought down to zero
- Photographic stillness is not tantamount to death, because death, too, is an unfolding narrative that makes the “now” exist
- In a radically different manner, duplicording *stops* the narrative. It prevents its unfolding in the “now” by turning it into an abstraction as a “then” stored in the white space. Thank you Prof. Ma for making that clear.

My practice is rooted in observations and straightforward hands-on interventions. I did read a theoretical work once. It was ... well ... interesting, but also quite self-indulgent in the inflated importance ascribed to some of its points. The points

were OK in a clever sort of way, I suppose. But were they really groundbreaking? Not just common knowledge dressed in elaborate jargon? I disagreed with the mortuary association of the book's second half. Yet, I have to admit that I did have a truly illuminating moment when I read the famous "photograph of the winter garden" passage; it was the conclusion that got me. At long last, here was a simple sentence that expressed how I felt about the (possibly irreversible) madness that photography had injected into life: "Society is concerned with the taming of the photograph, to temper the madness that keeps threatening to explode in the face of whoever looks at it."⁴⁵

In today's digital world of ubiquitous electronic deceptions, the most noticeable effect of recording is to make "reality" and "fiction" mirror each other to the point of absolute confusion, its overall impact on life growing exponentially. The most pervasive manifestation of this is big data. The fundamental function of big data is to *record*. It was the photographic camera that initiated *that recording*. However ineluctable this evolution may seem, I am hopeful that understanding what recording, or rather duplicording is will help to negotiate the dystopian implications of a medium that has been the vehicle of the universal expansion of the wondrous moments of artistic exchange and contemplation, which make us human. How to negotiate this paradox is, to my mind, one of the most pressing questions we face today?

Dear scientists, and most specifically YOU quantum physicists, *when are you going to let the madness of the photographic stillness explode in your face?* When will you allow the dynamic potential of its chaos to awaken you from the routine-induced stupor of your laboratories, and make the enigma of stillness (that should not be there at all) the subject of your most obsessive quests? When will you stop seeing photography as a devoted maid and take her for the mysterious, mesmerizing temptress she has always been; a temptress that will, in revealing her secrecy, also reveal the hidden power of the mastered duality? For this is what awaits us: the hidden power of the mastered duality inherent in the duplicording energy. Do you know that your hopeless passivity is the cause of a failed manifestation of infinite virtual ecstasy promised to us long ago by the natural evolution and located in the pinhole phenomenon? Please, dear scientists, be reasonable, ask yourself this question: where did that thing that could stop time come from? How and why did it appear so surreptitiously? How and why did it transform the world in what, by cosmic standards, is less than an eyeblink? At this point, things can go right or wrong, possibly very wrong. But most of you don't see how wrong things have already gone because you are

45 Roland Barthes, *Camera Lucida*, trans. Richard Howard (New York: Hill and Wang, 1980): 117.

not aware of what has happened. Please could some of you try to make George Orwell's 1984 fiction again, rather than reality? Please trust my visionary acumen when I say that this last-minute exit will open for us only if we acknowledge the true nature of the duplicording energy. Only you can do this.

And now for manure: Closing considerations (Gilles Massot)

What shall we make of this duplicording energy? It created the big data monster that so frightens Gila Masok, but it also helped unfurl limitless creativity. Like everything under the sun, duplicording energy is neither absolutely good nor bad. It is defined by what we (choose to) make of it. The fundamental question of *choice* (and its attendant ethics) was eloquently addressed by Vilém Flusser in his 1983 *Towards a Philosophy of Photography*.⁴⁶ May the present words be cobbles that pave the way to an ethical use of photography. As noted by Marceau, the photographic blurring of boundaries between reality and fiction heralded the digital world, which soon came to replace the medium's earlier analogue identity. With the white space, it announced a world of quantum probability quantified by a set of binary bits, 1–0, “being” versus “non-being.” Being and non-being have been the intuitive cognitive sources of identification since the dawn of time. As the basis of manifestation and quantification, One is equally ancient. But Zero is a pure invention.⁴⁷ It is a relatively recent symbol conceived as a representation of ultimate nothingness. Zero is highly useful in calculus, however, zero is also the paradoxical “being of non-being”; there is nothing rational to it. Shouldn't we be concerned, or at least, perplexed by the fact that ultimate nothingness now insidiously defines the binary rhythm of our digital existence? Can the permanent yet unnoticeable bouncing back and forth between being and non-being through which we operate all day long when staring at our phones or computers screens

⁴⁶ Vilém Flusser, *Towards a Philosophy of Photography* (London: Reaktion Book Ltd., 1983).

⁴⁷ The concept of a “missing number” was already part of the Sumerian system of accounting in 2000 BCE, but was not developed as a full mathematical entity. This groundbreaking conceptual and scientific development is credited to the Indian mathematician Brahmagupta around 650 CE. It reached Baghdad in 773 CE and Europe via the conquest of Spain by the Moors in the same century and became fully operational in the ninth century with the invention of the algebra and algorithm by Mohammed Ibn-Musa al-Khowarizmi, whose translated works were available in England by the twelfth century. Nils-Bertil Wallin, “The History of Zero” (19 November 2002), *YaleGlobal Online, Yale University* <<https://yaleglobal.yale.edu/history-zero>> (acc. 19 October 2018).

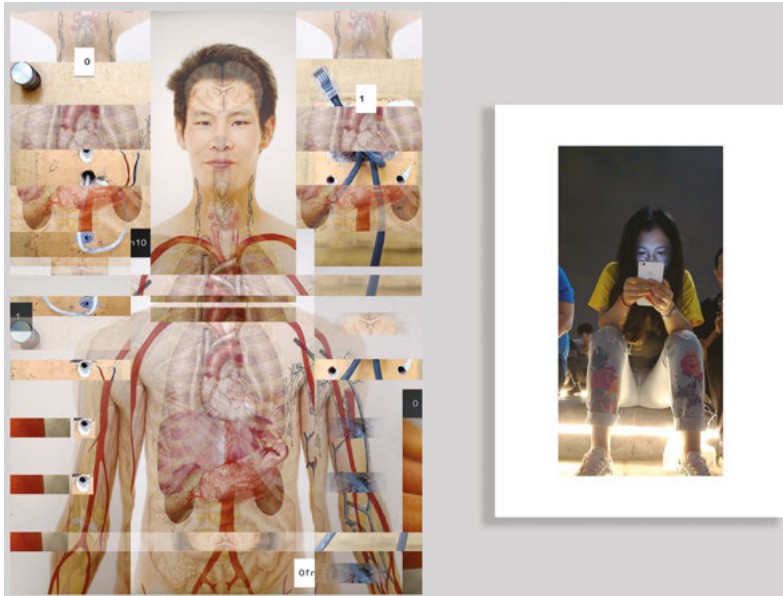


Fig. 1: Gilles Massot, *Portrait of an Evolution*. 2018 (a portrait of a fully operating connected biological unit and its connectivity diagram). Courtesy of the Artist.

be without consequence (see Fig. 1)? Considering that the world is gazing into actualized nothingness every other second, isn't it logical to think that the extreme volatility that currently prevails in the world has something to do with it? Far from giving us more time as was naively envisioned at first, digital technologies have given us more things to do. They have filled up every possible space, whether emotional, intellectual or physical, with an overflow of abstract information. Could the global warming in part be the planet's reaction to the overheated global consciousness? Or, might these questions be interpreted as no more than the current evolutionary phase of a fundamental concept materialized in and through a simple physical phenomenon; a chaotic phase but possibly a temporary one? Both the pinhole phenomenon and the duplicording energy have been perfected by nature and by humans, to fit both nature and human society. The implied determinism might well reflect *necessity* rather than accident. The indefinitely slow evolution of this necessity came to an abrupt resolution with the explosion of a revolutionary perception/manifestation of time-space at the surface of planet Earth that was sudden and instantly became universal. White space was born in and from it. In the white space, reality and fiction mirror each other. In the physical world, being and non-being have teamed up to advance what we – Marceau, Ma, Masok and

Massot – see as a *planned mutation* that would take us from restrictive physicality to a boundless virtual world. Planned by whom or what is not a relevant question right now. This is most definitely an evolution with a sense of purpose inscribed in its own narrative. Could photographic stillness have raised being and non-being to a state of equilibrium in which they are harmonized in a suspended state of near-perfection? Could this be the silent dialogue the world had long been waiting for, a pregnancy of becoming fertilized by the hypnotic fascination of conflicting physicality and sympathetic abstraction? What if this miracle was understood and used accordingly? It could create a world in which controlled eternity would have no reason to disintegrate but might, in fact, prevent self-destruction while protecting the empty perfection of the ultimate void. But foolish me, these are mere technicalities for a distant future. In the meantime, shall we agree on the blueprint? Acting now would save us the time we don't have.

