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# Muta – Morphosis

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Marshall McLuhan, Canadian professor of English literature once said: "We shape our tools, and then our tools shape us." As soon as the use of digital tools and processes started in art and design, the creative output began to be influenced by these tools, processes and evolved into a new aesthetics. Computers seem to have very precise and strict rules about how one uses them and this concrete 'mechanical' aspect leads to the perception that abstract notions like spontaneity and serendipity cannot exist in the course of digital creation. This view is challenged both by scientists and artists. One of the early and significant efforts is 'Cybernetic Serendipity'; the first large international exhibition of electronic, cybernetic, and computer art which took place at the Institute of Contemporary Arts (ICA) in London, UK, from 2 August to 20 October 1968. "The title of the exhibition suggested its intent: to make chance discoveries in the course of using cybernetic devices, or, as the Daily Mirror put it at the time, to use computers 'to find unexpected joys in life and art." (Usselmann, 2003).

Creativity is stochastic and assumptive in nature. The importance of randomness in the creative process must not be ignored, underestimated or intentionally disregarded in a condescending way. Notions of chance, randomness, or unpredictability are much important, especially when it comes to artistic creation. For instance, artistic movements such as Surrealism and Dadaism "used impossible, incongruent images to provoke unexpected truths and sentiments through metaphor, mistake, absurdity, spontaneity, and serendipity." (Hinrichs, 1995)

This dimension of unexpectedness can be taken to the apparently paradoxical conception of 'aesthetics of failure' level; where, be it good or bad, you find accompanying abstract concepts of surprise, luck or chance. These concepts are quite in harmony with the phenomenon of internet, where non-linear navigation is of intrinsic nature. Internet surfing is a fantastic practice of serendipitous discovery, in which getting lost to find an unanticipated result or content is highly typical.

# Serendipity and Spontaneity in the Context of Discovery

Serendipity plays an notable role in the history of revelation, within the fields of criminology and science in general. In other words, any insignificant environmental incident carries the potential of inspiring a solution which can unexpectedly surface from the unconscious mind. This frequently happens when one takes things easy. Imagine Archimedes in his bathtub, finding the principle that can be shortly defined as 'any object, wholly or partially immersed in a fluid, is buoyed up by a force equal to the weight of the fluid displaced by the object', or Newton under an apple tree, with a falling apple that initiated the universal theory of gravity. Serendipity, however, hits only the willing mind. Both Archimedes and Newton had been working on their corresponding challenges for some time and were consequently 'alerted' to their resolutions. Not everybody sitting in bathtubs or under apple trees will find inspiration for invention without spending the prerequisite effort.

Ward, Finke and Smith describes this alertedness through "Archimedes Archimedes' experience: was the greatest mathematical and scientific thinker of the third century B.C., and King Hiero of Syracuse, his relative, knew it. Archimedes had proved this to the King when he built a machine that, powered by one arm, could move a fully loaded ship out of a dock, whereas the entire Syracusan crew, without the machine, could barely budge the ship. King Hiero asked Archimedes to determine whether a gold crown he had commissioned had been surreptitiously alloyed with cheaper (and less dense) silver. Archimedes attempted first to determine the volume of the crown, so that he could compare it with the volume of an equal weight of pure gold. The crown was such a complex shape, however, that Archimedes was initially thwarted. When he neglected his personal habits in his absorption in the problem, his friends carried him by force to the public baths. While in the bath, he noticed the water displaced by his body, and he realized that the crown would also displace an equal and measurable amount of water. Screaming 'Eureka!,' he is said to have run straight home in his excitement, without pausing to dress himself." (Ward, Finke, Smith, 1995)

Did Isaac Newton really come up with the theory of universal gravitation after being hit on the head by an apple? Royal Society publishes memoirs of William Stukeley, 18th century author with firsthand account of the scientist's discovery. The Royal Society made a 100-page manuscript by the physician Stukeley available online for the first time, as part of the Royal Society's Turning the Pages project. (http://ttp.royalsociety.org/ silverlight/?id=1807da00-909a-4abf-b9c1-0279a08e4bf2). The apple story is on page 43: "After dinner, the weather being warm, we went into the garden and drank tea, under the shade of some apple trees," wrote Stukeley, in the papers published in 1752 and previously available only to academics. "He told me, he was just in the same situation, as when formerly, the notion of gravitation came into his mind. It was occasioned by the fall of an apple, as he sat in contemplative mood. Why should that apple always descend perpendicularly to the ground, thought he to himself."

Umberto Eco, at a lecture he gave at the University of Bologna for the opening of the 1994–95 academic year, with the polemical title of "The Force of Falsity," touched upon the concept of serendipity within discoveries as follows: "I wanted to show how a number of ideas that today we consider false actually changed the world (sometimes for the better, sometimes for the worse) and how, in the best instances, false beliefs and discoveries totally without credibility could then lead to the discovery of something true (or at least something we consider true today). In the field of the sciences, this mechanism is known as serendipity. An excellent example of it is given us by Columbus, who-believing he could reach the Indies by sailing west-ward-actually discovered America, which he had not intended to discover. (Eco, 1998) Another noteworthy example of unintended scientific discovery is given by Thomas B. Ward, Ronald A. Finke, and Steven M. Smith in their book titled "Creativity and the Mind: Discovering the Genius Within": "There are many cases where people have made important discoveries by shifting their focus away from a particular problem, and by noticing something alluring about an unexpected result. The discovery of safety glass is a good example of the role that serendipity has often played in creative invention. The French chemist Edouard Bénédictus invented safety glass after accidentally knocking down a beaker that had held cellulose nitrate, and noticing that its shattered pieces held together. He had not planned to invent safety glass, but the accident provided him with a fruitful idea to be exploited. Such discoveries can be missed if a person focuses too narrowly on one particular

outcome, and ignores significant 'accidents' that might give birth to other possibilities. [...] In light of this, it may sometimes be better to wait before trying to interpret a mentally synthesized form. This might increase the chances of discovering new, inventive possibilities. For instance, when combining parts in imagination, you might start out by creating forms that seemed inviting and important only in a very general sense, before committing yourself to developing a particular type of invention. (Ward, Finke, Smith, 1995)

Though not the same thing, spontaneity is quite harmonious with serendipity. As being the state of staying free from constraints, formalities, obligations and referring to informality, naturalness, voluntariness; spontaneity is open to improvisation, a mood very much needed in artistic and scientific creation process. A memory not blocked by old facts, personally undigested theories/techniques of other people's findings and unquestioned common information, will be readv for spontaneous inventiveness. Spontaneity is the moment of individual independence when we confront reality. This state of mind is usually a child's, which can be conceptualized by the term 'tabula rasa', which is "is the epistemological theory that individuals are born without built-in mental content and that their knowledge comes from experience and perception," according to Wikipedia definition. This state of being devoid of preconceived thoughts is usually very much needed in artistic practice in order to be able to create novel content, that avoids possible labeling of 'this has been done before.' Spontaneous art expression that has nondirective dimension is also used in psychology as psychotherapeutic or counseling technique in which the therapist takes an unobtrusive role in order to encourage free expression and problem resolution by the patient.

## Various Approaches towards Creation in Science and Art

Science and art have/had a persistent, permanent and stable relationship. They have always been interconnected, interrelated and intersected; even though their substances and implications kept changing during the centuries. Since their interest areas naturally correspond, they constantly inform each other; despite the sometimes seemingly antagonistic relationship. Both are methods of exploration; both involve ideas, concepts, theories, assumptions, postulations, premises and hypotheses that are assessed in settings where theory and practice come together; the laboratory and studio. Artists, like scientists; study ethos, mythos, culture, matters, societies, philosophy, history, mythology, folklore, tradition, religion, etc. and learn to convert, appropriate information into unique material. In archaic Greek, the term for art was 'techne', from which technique and technology are stemmed. History demonstrates that the two disciplines cannot survive without each other, prevailing in a continuously fluctuating and progressing relationship.

This inevitable relationship does not mean that science and art usually have similar approaches, as Ward, Finke and Smith state in the following quotes: "Art appeals to our emotions, whereas science deals with logic and mathematical relationships. A good scientist cannot be ruled by irrational emotions. Art is fundamentally subjective, whereas science relies on objectivity. Art is often wild and fanciful, while science needs to be rooted in reality. [...] The scientific method is a cyclic process. It consists of hypothesizing, or guessing what will happen in a scientific study, testing the hypothesis in a systematic way, observing the results of the test, and interpreting the results. To avoid subjective biases and misinterpretations, scientists strive to carry out the entire process in as objective a manner as possible. Stated this way, the scientific method appears to be a very orderly and predictable process. [...] The artistic process has not been so clearly articulated or agreed upon as the scientific method. Artists are often noteworthy for their eccentric or iconoclastic approaches to art. No consensual method is apparent in the creation of art, as there seems to be in science. Despite these superficial differences, however, there are some important similarities between art and science. These similarities include interactions between the two domains, parallels between the ways in which advances are made in the two, and similarities in the cognitive processes that give rise to these two important human endeavors." (Ward, Finke, Smith, 1995)

Science deals with nature, humankind, society and endeavors to investigate the principles of their presence. It employs ubiquitous scientific systems, by taking all possible fundamentals of nature into consideration. It is unrestricted by prejudice and steered by a high measure of awareness. The objective of science is to establish an equilibrium between humankind and nature by studying the regimes of the universe. Art, in contrast, transmits a message about the society and the ecosphere, which derives from both sentiment and sensitivity. It anticipates to excite our emotions and aspires to entertain, induce gratification or make us receive its moral.

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Antagonistic or friendly, the link between art and science is indeed a fruitful one. Art is science, because it is all about research and not only inspiration; contrariwise, science is art when a scientist sees beyond the typical relations among the components of a whole and finds a new relationship somebody has not seen before. What is needed seems to be an artist who can reason like a scientist, or a scientist who can appropriate like an artist.

#### Mutually Influential Relations between Science and Art

One of the best examples that comes to mind when collaboration between science and art is mentioned, is obviously the incredible Leonardo da Vinci. Painter (artist) and draftsman (professional) of the High Renaissance, he is best identified as a creator whose works were enlightened by scientific research. Da Vinci monitored the planet meticulously, exploring physiology and anatomy in order to generate compelling representations of the human figure. He trusted that the moral and virtuous connotations of his anecdotal paintings would materialize only through the precise illustration of human gesticulation and expression.

If we take a look at later examples in art history, "the Impressionist movement was inspired in part by scientific work on the way primary colors are combined in the human visual system. The 'atomic' paintings by the Surrealist artist Salvador Dali, which depict objects disintegrating into their most minute components, were partly inspired by atomic physics theory. The mind-bending illusions created by M. C. Escher resulted from his masterful understanding of the principles of object perception." (Ward, Finke, Smith, 1995)

A rather more contemporary successful model of alliance between science and art is photography, since it entails these two discrete constituents in an exceptionally inevitable way. Photography is one of the artistic fields at which technological advances influence artistic expression the most. The ease of manipulation brought by software and extra features available in cameras made artists -using photography as an articulation tool- reconsider their visions, themes, narration, syntax and ways of sharing their artwork.

While some photographers, who are deeply obsessed with analog processes, deny digital technology; it is quite obvious that artists, who are aware of the complexity and particular advantages that this technology brings, indeed end up with a novel aesthetics of photography. In addition to the regular montage and collage methods remaining from the old analog days, digital imaging techniques allow artists to work with notions like augmented perception, chronophotography, subreal encounters, pictorialism, palimpsest-like superimposition, interlacing, simplification/minimization, creation of new worlds, delusion, synthetic realism/artificiality, appropriation...

The much assigned heavy load of 'conveying reality' to photography has fortunately and partly started to retreat, and a novel, digital aesthetic in photography is developing. Digital imaging technologies paved the way to the comprehensive restructuring of the visual image making, sharing and aestheticizing. We can compare between a traditional 'prescriptive, authoritarian and rather conventional' aesthetics vs. a new 'generative, irregular, unprescribed' aesthetics. A quote from Anna Munster will validate the unavoidable connection amidst art and science: "Aesthetics in contemporary culture cannot rise above and remain undisturbed by the machine, for the machine is more intimately than ever an arranger of our perceptual apparatus." (Munster, 2006)

## **Consequences of Unpredictability and Chance**

Directly associated with the concepts of chance and probability, randomness suggests a lack of predictability. Randomness is a conception of non-order in an order of codes / phases, such that there is no comprehensible pattern or grouping. In antiquity, the notions of chance and randomness were interwoven with that of fate, destiny, fortune, doom, etc. Various ancient peoples threw dice to 'influence' fate, and this later grew into games of chance.

While randomness had often been taken as an obstacle and annoyance for many centuries; in the 20th century, computer researchers started to appreciate that the premeditated insertion of randomness into computations can be an efficient instrument for devising better algorithms. In some cases such randomized procedures surpass the most respected deterministic methods. This is how stochastic methods gained significance in the field, by making chance bump into formula and sequencing random components with a discerning process so that only particular consequences of the random are tolerated to prevail. It may be argued "that creativity necessarily involves a heavy dose of chance. The probabilistic nature of creativity is first illustrated in the two phenomena of multiple discovery and creative productivity. [...] The stochastic feature of creativity in terms of the creative process, person, and product." (Simonton, 2004) In this process of linking chance to creativity, one must keep in mind that chance usually prefers the prepared, willing and organized mind. A good example to this is the Dadaists who embraced chance as their path to unique expression in their artworks and appreciated luck as an extra stimulus to artistic creation. "Several rather different artistic movements have developed procedures for generating art through more or less autonomous processes, initiated by an artist who would not be able to predict the final result: écriture automatique, action painting, physical experiments, biological processes, systematic, conceptual, and stochastic art. Sol LeWitt: 'The artist's will is secondary to the process he initiates from idea to completion. [...] The process is mechanical and should not be tampered with. It should run its course.' (Scha, Vreedenburgh, 1994)

Chance plays similar roles in the scientific realm as well. Wilhelm Conrad Roentgen's chance discovery on Nov. 8, 1895, had let the German physicist to see the invisible, to gaze through solid bodies; and for the first time, see the bones and inner organs of alive people. "In 1894 Roentgen had turned his attention to cathode rays and by late 1895 he was investigating the fluorescence caused by these rays using a Crookes tube. In order to direct a pencil of rays onto a screen, he covered a discharge tube with black cardboard and operated it in a darkened room. Roentgen noticed by chance a weak light on a nearby bench and found that another screen, coated with barium platinocyanide, was fluorescing during the experiment. He had already established that cathode rays could not travel more than a few centimeters in air, and as the screen was about a meter from the discharge tube he realized that he had discovered a new phenomenon. [...] On 28 December 1895 he announced his discovery and [...] concluded that x-rays were quite different from cathode rays but seemed to have some relationship to light rays." (http://www.answers.com/topic/wil helm-conrad-r-ntgen)

Alternatively, "algorithmic art, where a process is defined by completely explicit rules, is executed by the computer with extreme consistency and accuracy. By employing mathematical simulations of chance, the unpredictability of the outcome can be maximized. [...] Art is often viewed as a medium that an artist employs to transmit profound thoughts to his audience. But what an observer considers important or meaningful in an artwork is often independent of the artist's intentions. That a computer has no intentions at all, is thus no reason to doubt the possibility of fully automatic computer-generated art." (Scha, Vreedenburgh, 1994) Finally, the errors we encounter in digital processes and appropriate for artistic purposes make computing humane, since mistake is a very humanly concept.

## The Birth of the Series called Muta-morphosis

In year 2009, I was commissioned to photograph cement factories of a large industrial establishment called OYAK. In one case, there was a port next to the factory and I was requested to picture them both in the same photo. There was only one distant viewpoint from which they could be photographed together and the resulting photo ended up to be a thin and long panorama. This image was not very suitable for their purposes since a thin and long panorama would look awkward in a page spread. Yet, this was the only solution and there was nothing else to do. Suddenly I remembered a presentation that I saw in SIGGRAPH '07, where I went to exhibit my digital artwork at the Art Gallery. The presentation was titled "Seam Carving for Content - Aware Image Resizing" and it was authored by Shai Avidan, Ariel Shamir (Proceeding, SIGGRAPH '07 ACM SIGGRAPH 2007 papers, ACM New York, NY, USA ©2007).

I was quite impressed by what this software could do. Briefly, it would allow compression and/or expansion in one axis without distorting the image content. The idea of 'content-aware scaling' was not available as a commercial software until Adobe introduced Photoshop CS4 by the end of 2008 and included it as the 'Content-Aware Scale' command under the 'Edit' menu. For a moment, I thought this command would be a fantastic and quick solution to the problem. I opened the excessively long panorama in Photoshop CS4 and I applied the processor intensive command: The result was a failure... Though I did not exaggerate the extent of the command's implementation, the diagonal lines in the image were completely destroyed in continuity and broken in separate pieces.

The command failed me, I was disappointed; yet, the frustration did not take long and I felt like screaming "eureka!" OK, reality was distorted, image content was altered in an unacceptable way; but I could use this to create artworks that had idiosyncratic aesthetic results with strong conceptual connections to the content of the image. Since I always loved panoramic photography, I took many of them in various places, as an artist and academician who travels frequently for exhibitions and conference presentations. As a consequence, I

tried the "Content-Aware Scale" command on three images from my archives first: One in Istanbul, the other in Alexandria and the last one in Cairo. The result was very pleasing, this signaled the birth of a new series: A scientific research project and tool again helped an artist to discover a new language for expression.

If one wants to analyze the type of creativity involved in above process, it may help to introduce the following quote: "We distinguish between two types of creativity. First, there is creativity in perception and problem solving. This is the analysis and representation of given information which we call input creativity. Second, there is the production of something new, that originates within the creator. We call this output creativity. An example of input creativity is solving a chess problem. An example of output creativity is devising a chess problem. Listening to music requires input creativity, whereas composing music requires output creativity. (Partridge, Rowe, 2002) According to above definitions the series titled 'Muta-morphosis' can be considered as a mixture of input and output creativities.

The unique aesthetics of urban compression that resulted after the above mentioned content-aware scaling, does not refer to the typical condensed image where each image component is affected by the one-axis scaling and gets excessively slender and tall. Rather, it is a textural fusion of intertwined image blocks that stayed relatively recognizable after the compression. The 'collage-city' subsequent pattern displays а structural connectedness to my previous architecture and city planning background. Finally; concept text for the series of Mutamorphosis goes as follows: "The different traces left by various people and slices of time coexist as layers in cities that have a particular past. The global trends and economical conditions strain this multi-layered traditional urban structure. An architecture with a language that cannot be considered as local anymore but universal, attacks the old texture of cities during the urban growth. This intervention usually implemented through gentrification supported by big capital, causes the urban tissue and its components to face mutation and even beyond this, undergo metamorphosis. Following this interaction and consecutive natural selection, some constituents disappear and some survive after being transformed.

The concept of 'muta-morphosis', a combination of the notions of mutation and metamorphosis, and the connected artwork series was obtained by reducing panoramic images on one axis. The image compression on the horizontal level points to the dynamics between the urban components that can persist and the ones that give up, vanish in the various historical, residential and business urban districts. The visual urban result obtained after this contraction process points to the much discussed notion of evolution, where stronger components of existence survive the others after a natural selection process and change the course of life. The lack of a single perspectival structure due to multiplicity of perspectives after panoramic imaging, can be linked to Ottoman miniatures, which in turn, connects the global contemporary representation to its local traditional counterpart."

## Conclusion

Contemporary aesthetics is a subject under construction due to the rich variety of fresh expressive means supported by the computational creativity, nourished by artistic spontaneity and improvisation. The series 'Muta-morphosis' could only be created within the digital realm, and it indirectly points to the mutation and metamorphosis in aesthetics in general. "Technologically based art does not just change the kind of art that is made and our relationship to it, but it changes the nature of human perception. Technological instrumentation makes it possible to see things that could not have been seen before and to see them in a way in which they could never before have been seen." (Lovejoy, 2004) "Just because a medium is structured does not mean that it has to be confining. The presence of structure does not necessarily reduce the opportunities for improvisation and expression. As we overcome the residual notion that computing is for objective documentation only, we must cultivate expressive sensibilities. These may result in a digital aesthetic or poetics, and they may involve artifacts that convey latent content and reflect active intent." (McCullough, 1998)

Though there are studies on exceeding human sensory capabilities, our visual perception still takes 'what the eyes see' as the basis of apprehension. In this case, artists who intend to go beyond what one can see with the naked eye, take advantage of software like Photoshop, PS plug-ins and multiple image stitching programs. These digital means enable artists to assemble and convey information in a holistic manner that is otherwise not possible to record in a single photographical documentation act. The resulting totality leads to a particular aesthetic form which turns out to be the synthesis of individual forms, in other words a 'sui generis' situation. One can interpret this as a cubist approach...

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The above mentioned unique synthesis is further supported by serendipity, which is the expected contribution for making expedient discoveries by coincidence, by chance. To put serendipity into work, there is need to accumulate a list of questions that need solving, acquaintance with already existing answers, and their use in daily life. Only when this knowledge is present, 'chance' can take its part in establishing the perfect milieu for the 'problem' and the 'solution' to find each other. If there is already a great deal of knowledge accrued in our minds about the problem and the requisites for the solution, chance adds the final piece to the puzzle.

## Figures



Figure 1. Muta-morphosis #1, Istanbul. Artwork by the Author

Figure 2. Muta-morphosis #2, Alexandria. Artwork by the Author



Figure 3. Muta-morphosis #3, Cairo. Artwork by the Author



Figure 4. Muta-morphosis #6, Safranbolu. Artwork by the Author



Figure 5. Muta-morphosis #46, Osaka. Artwork by the Author





Figure 6. Muta-morphosis #79, Istanbul. Artwork by the Author

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