New technologies, educational expansion of the arts and design

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Luz de Carmen Vilchis Esquivel[1]

ABSTRACT

This is a dissertation on the metaphors between technology, teaching, the arts, and design. Man, homo faber, in his ability to transform nature, has evolved thanks to his ability to apply experience and knowledge about living systems to plastic or designed systems. The only testimony of many of these cognitive transferences remains in the multiple objects bequeathed through the centuries.

The best-known example recorded in writing is that of Leonardo da Vinci, who in his notes expressed great interest in bats as models for flying machines, especially for the way their membranous skin reinforces and coats the skeleton, which is essential for wings and flight.

I will begin, first of all, by making certain experiences, because I want above all to begin with experience [...] I will show why bodies are obliged to behave in this or that way. It is the method which we must observe in the investigation of natural phenomena [...] it is true that Nature begins with reasoning and ends with experience, but it is necessary for us to proceed in a different way and to begin with experience in order to discover the law. (Da Vinci, 2004, p. 23)

The systematization of the functioning of objects taken from living systems or from technologies that present the characteristics of such systems is contemplated in the science called Bionics. In the various branches of this discipline, such as Genesa, we identify an infinite number of graphic reproductions of nature. However, the most controversial and revolutionary are those that have been aroused by the analogy with man himself, and of them the one that has undoubtedly become transcendental in the last decades of this century is the one that has given rise to the invention and development of computers.

The crux of this controversy centers on the fact that the analogy of computers is given in the first instance with the human brain, in the second with the nervous system, and finally with our main sensory capacities, namely, sight, hearing, and touch, and their consequent extensions in the visual arts and communication. When motor possibilities are added to them, we enter the field of robotics and when perceptions and data of time and space are evoked, the reference is to virtual reality.

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[1] Dr., Graduate Program. Faculty of Arts and Design
National Autonomous University of Mexico (UNAM)
E-mail: linusviel@gmail.com
ORCID: 0000-0002-4180-4764

INTRODUCTION

A field of study of the communicational potentialities of computers called *artificial intelligence (AI) has been opened*, an area of computer science that investigates the possibilities of *artificial perception*, *reasoning* and *action*, similar to those of man or other living beings that allow machines to perform *autonomously* tasks in a real-world environment. The essence of computers is to simulate events from descriptions, they can imitate x,y,z and show situations whose experience we cannot have in reality.

> AI is the ability of machines to use algorithms, learn from data, and use what they learn in decision-making [...] AI-based devices don't need to rest and can analyze large volumes of information at once [...] the error rate is significantly lower in machines that perform the same tasks as their human counterparts. (Rouhiainen, 2018, p. 17)

Tacit human-machine comparisons or *metaphors* have occurred both at the operational and linguistic levels, generating a parallel conceptual duplicity in terms of human capabilities and technological functions.

For this reason, we find terms such as *memory, thought and learning*, among others, attributed to certain activities of machines, reaching what Marshall McLuhan (1969) predicted in the sixties regarding the impact of the instantaneous relationships between a technology and man's conscious knowledge, giving rise to the fact that, in this case, computers, They give the impression of the action of *thinking* even though in reality we find the total absence of the process which constitutes consciousness itself.

This implies that we forget that these means are an extension of human beings and that, even if in the future it is possible to *emulate* consciousness in a computer, the machine would continue to be an extension of our own consciousness. A more detailed analysis of the finer analogies will allow us to have parameters to regulate these criteria.

Undoubtedly, machines resemble human beings, one of the most important features of this is that they must perform specific tasks and consequently possess *organs of action*, which authors such as Norbert Wiener (1981) identify as analogies of arms and legs; another characteristic is that they need *sensory* extensionsLike photoelectric cells or thermometers, which identify data from the outside world and warn about the circumstances surrounding them in order to choose whether or not to execute a task, this function is called feedback or the ability to adjust responses to past events.

This leads us to consider that, from one point of view, the machine has *conditioned reflexes*, and from another, it deploys *learning* actions. And, yes, for these ways of proceeding, machines have decision-making elements, such as the central processing unit or CPU, thus giving a fundamental analogy with the nervous system. In both the machine and the nerve there is a specific mechanism to

choose options in the future according to past experiences, in the nervous system this task is carried out at points of extremely complex organization called *synapses*.

> The transfer of information between neurons occurs at the level of a specialized junction called synapses. Through it, the electrical activity of one neuron, called a presynaptic neuron, influences the activity of a second neuron called a postsynaptic neuron. If the synapse is established between a neuron and an effector, be it muscle or gland, it is called the neuromuscular or neuroglandular junction. Each neuron makes an average of about 1,000 synaptic connections, and they probably fall on it about 10 times as many. It has been estimated that if there are about 1011 neurons in the brain, there will be about 1014 synapses. (Noriega & Merino, 2011, p.1)

This implies a process of knowledge, first receiving information and elaborating learning sequences with it. The computer is basically fed three conceptual categories: *objects*, *relationships* that establish meaningful links between one object and another, and *processes* that govern the creation, destruction, transformation, and various other modes of objects. The machine, like the human brain, accumulates information in memory, the distance in this phenomenon is that the human being unlike the machine chooses his memories and has the ability to forget.

THE UTOPIA OF TEACHING ARTS AND DESIGN THROUGH MACHINES

In relation to *apparent learning*, computers are built for four types of *simulation*: *mechanical self-programming* or non-selective retention identified with the summative accumulation of data, *self-programming of* pre-established parameters or routines, *self-programming of methods* that leads to algorithms applied to specific situations, and *self-programming of methods.Self-programming of statements* , which means, in the machine, building a new structure of instructions from more elementary operations previously fixed.

There are, then, fundamental contrasts by which equivalence is not total with human beings, the most decisive being that between the mechanical rigidity of machines and the mental fluidity of the human being that provides him with the capacity for infinite *intellectual expansion*. Man possesses the ability to adapt to radical changes in his environment through a peculiar physiology that allows him to learn throughout his life and use his conscious judgment for an infinite number of possible relationships of his learning.

True, a computer can *see* if it contains a TV camera or other visual sensor, a central processor and sufficient memory, adequate interconnects to transmit visual data to memory, and proper programming to interpret the data that memory receives. It is also already a reality that computers *listen* through their audio systems and express themselves verbally with the same devices.

Nor should we doubt its ability to communicate *tactilely* with other computers by creating what has been called the neural network composed of millions of artificial sensors connected to each other that are essentially integrated circuits that, today, already recognize patterns, the reading of

manuscripts and self-programming, allow interpersonal relationships based on ingenuity and intelligence, own a place in virtual space or cyberspace, and have generated illusions such as the creation of virtual information beings. There are those who claim that this amounts to reproduction and that the machine becomes obsolete like people.

However, the cybernetic machine is at the end of the day an apparatus that executes a set of operations according to a defined set of rules, we program the machines, that is, we give them a group of instructions about what to do in each eventuality, which, according to Christopher Horrocks (2004) is one of the evidences that the medium is not the message and that the characteristics of the message make up the medium. The complete rules will completely determine the operations at each stage, in which there will be a definite instruction, all of which together constitute the mechanical act.

INTELLIGENCE AND CREATIVITY, THE PRIVILEGE OF ARTISTS AND DESIGNERS

In meticulous analysis it turns out that machines and people in their use of instruments are equivalent, there are incompatibilities between the two that can never be eliminated, because the mechanical act can simulate the human act, never be the same and futurisms like this coincide with the idea that computers "

> [...] could be connected to private and collective consciousness and be able to process and communicate pure thought between people's minds, these visions allow us to discern how *techno-romanticism* visibly clashes with contemporary *emerging techno-realism*. (Horrocks, 2004, p. 37)

In the human act, especially in the act of *creating visuality*, mental mechanisms are expressed in various ways, one of them is the concern for the manipulation of symbols, the coding and deciphering of visual language in a complex process of consciousness and understanding, to this are integrated schemes of interpretation and communication that allow purposes of discernment, associative memory, verbal learning, concept formation, belief systems, imagination, initiative, originality, and creativity.

Machines do not possess life, and when referring to them we should avoid certain adjectives, this is a request of an ethical nature, among them are *life*, *soul* or *vitalism* so as not to blur clear boundaries between machines and people. We do not deny that machines are becoming more and more like man and *vice versa*, say some fanatics, but let us not lose the dimension, none of the chemical or spiritual phenomena of life, as we understand it, are the same as those of the machine of which we perceive only a local phenomenon of imitation.

We require, because of what defines us, because of our *human* being, expressions, gestures, tones of voice, sighs, gasps, laughter, physical closeness, anatomical mimicry, caresses, kisses, not to

lose the sensation of bodily warmth that is one of our risks when establishing human relationships through networks.

The machines are cold and simulating, that is, they have accustomed users to the signs detached from the referents. Its well-achieved metaphor of the interactivity of thought in the human act makes us lose the center of its own dimension, and the theories of textualization and discursivity have converged with hypertextuality, the partial, fragmented and random knowledge contiguous of the multiple codes, effects and levels of reading of electronic communication.

Let's be careful, if we attribute to computers human qualities that are not feasible for them, we will engage with them from the beginning in an altered perception of reality, Wiener (1981) and Crosson (1971) are authors who warn about the danger of becoming slaves to *knowing how* without contemplating the *what*, the *why* or the *why* who are the ones who have made it possible for science to advance and transform its paradigms.

The infinity attributed to the so-called *new technologies*: embodied virtuality, telepresence, cyberspace, teletopia and digital cloning only benefit the greedy commercialization of hardware and software in favor of their excessive and apparent qualities and favor the multiplication of mythical worlds, defined by Pierre Lévy (2007) as the realms of the universe machinethat refers to the structure that underlies Western thought characterized by the ambition to travel the entire universe as an envelope, is a *Western normalizing vocation* to encompass from musical notation to science, in a sort of *omnipresence* in the Western imaginary rigorously elaborated and defined from mathematical logic in a tautological trajectory that begins with the invention of calculus and reaches the algorithm. manifested technologically, contemporaneously with cybernetic thinking, by computers. (Furtado, 2005, p. 11)

TECHNOLOGICAL LOGOS VERSUS AESTHETIC LOGOS

The *technological logos* related to the *aesthetic logos* leads to reflection on one of the many extensions that man has developed for his hands, it is considered the evolutionary paradigm of our species in the previous century and the origin of the *praxis* of the twenty-first century. This option is not so simple, it involves considering a society in which application precedes theory and the intellect forgets the theory of art to give way to creation that only considers artistic exercise. In particular, digital technology forms an epistemological complex whose vertiginous development and capacity for obsolescence often exceed the social possibility of the artist or designer to have access to it, preventing essential considerations about a niche of substantial importance.

Right now, somewhere in the world, technologies are being used that for artists or designers only exist in science fiction or complex film settings. Right now, somewhere in the world, technologies are being used that replace other technologies that visual artists or artists from other

disciplines will never have the opportunity to know. That is why we consider here a philosophical vision that points to the background and the way in which technology is applied and how this leads us towards diverse methodologies and results in the disciplines of visuality.

The *non-linear visual language*, the digital realm in particular and the creations that derive from them determine two directions of understanding digital artistic creation. There is a current of methodological definition that characterizes the process of digital graphics by the use of different technological resources to obtain a plastic or design result, as an example of this we have some electrographic productions originated in the work of digital capture by digitization or video, manipulated in the computer and graduated from it for xerographic enlargement or electrostatic printing. In this way, a final piece of electrography is obtained, whose content has traveled the path of technological resources with dissimilar characteristics, suffering the limitations and technical determinations of each of them, such as: loss of information in the conversion of the analog image to the digital one, the alterations made possible by the software, the new loss of information when interpolating pixels per inch to dots per inch and the qualities that each output makes of the color, adding formats, papers and pigment adhesion modalities.

The resulting plastic object is inserted into the space of the multimedia process as it is subjected to technological interactions. The visual work of this digitalist current is characterized by the horizontal method of *synchronous production,* the conclusion of which is offered to the viewer in a finished work that is perceived in the same time and place, which must be approached with expert eyes to understand that what is in front of us is an objectual survivor expressive of the operational inclemencies of technology.

It is important to point out that the traditional circuits of exhibition of works of art have assumed the variants of *electrography or infographics* as more manifestations of plastic or visuality and, decades away from their origin, they are part of the circuits of distribution and consumption, despite the fact that the quality of their permanence is not guaranteed and there are no conditions to determine their authenticity.

The other methodical category alludes to *diachronic* visual creation, in which the aspects of spatiality and temporality become determining factors of the result, which refers to multimedia practice that includes audio, video, graphic production, animation and text technologies to configure a complex creation evidencing its first characteristic, the integration of media.

However, if the creation is grouped under the parameter of one of these media, which is common when, for example, a digital installation is transferred to video, the plastic object, although multimedia in its origin, is returned to the synchronic genre and its effects are delivered in conditions of simultaneity to the viewer. In order for a digital work to belong to the diachronic category, whose effects are given to the viewer in *temporal sequence,* it must allude to the concept of *interactivity*

manifested in the capacity of a visual communication for the subject to approach it, consciously participate in the form of appropriation of the idea and decide the access routes to it.

Interactivity is the essence of this structure in multimedia visual art and therefore, it is the core problem to understand why the visual arts face a challenge that points towards fragmentation and randomness in the perception of the work, adding to this the problem of technical aspects such as formats, platforms and storage devices. This concept is not alien to the natural interactivity of the human condition that concerns the brain processes of associating ideas and is accompanied by decision-making that, in any circumstance, is non-linear.

Vairinhos affirms that in a large part of the works of *cyberart or cyberdesign*, some virtual *reality systems* and others expanded *reality*, implement specific models of interactivity that regulate the relationships between the perceiver and the work. That is to say, they separate the physical space of the spectator (the movement of the hand on the mouse), from the work or the design (cursor on the screen), with a high degree of *mediation*, they are new models of the so-called *emergent interactivity* that tries to break with the *current interactivity*. (Vairinhos, 2002, p. 11)

In the arts and design there are interactive manifestations that are not necessarily carried out with digital resources such as *installations*, *performance*, *artfax* or *visual poetry*, to mention a few examples, generated from a concept to which experiences are linked that enrich it by appealing to the universality of sensitive expression. *local mediation* (physical or symbolic distancing from the subject) and *temporal mediation* (desynchronization between the time of the subject and the object).

THE HYPERDIMENSIONS OF ARTS AND DESIGN

The artisticity of digital interactivity presents undirected routes, allowing the viewer to decide on their own scheme of visualization that branches out and assimilates into multiple references, interests and intentions and that risks perceptual abandonment.

Hypermedia *art or design*, conditioned to the computer monitor, expands technically under unconventional principles whose dimensions go beyond the flat space of non-Euclidean geometry. Hyperdimension is made up of three elements: time, movement and an expressive route accessible to the subject-work dyad. These objects of cyberart require permanence in the electronic medium, as *closed visual expressions* in interactive kiosks or as *extensive visual manifestations* in networks, as *plastic objects dependent on* the CDROM or *as creations of open interactivity* in the plastic manifestations of holography or virtual reality.

This presents us with the dilemma of an ephemeral and uncertain aesthetic. The phenomena that constitute these spaces of plastic creation demand a thought that is willing for the work to be the property of any individual, at any time, anywhere in the world, and that the viewer has the

opportunity to move through it in a *random* and *fragmented way,* since navigation does not guarantee the visualization of the whole. (Vilchis, 2016)

What is important for artists and designers is the humanized interface, as it alludes to specific considerations that fundamentally affect the biopsychosocial capacities of individuals, leaving aside the technological conditions of the machine. (Vilchis, 2016, pp. 52-53)

According to the same author, there is an unavoidable semanticization of virtual space from the perspective of semiosis in which the rhetorical sense, the sense of power, the paradigmatic sense and the sense of stability are deployed. The reading of the work in cyberart has no beginning or end, it is virtually impossible to determine which will be the next region of the image that will be contemplated

Gombrich explained the process of reconstruction in which reality is transposed in a symbolic way.

> [...] This is one of the conditions of the attractiveness of a symbol [...] it must be naturalized in our thoughts and traditions [...] if the etymology of symbols [...] has any value beyond curiosity, it should be to lay bare this overlapping layer, this penumbra of vagueness in search of success. (Gombrich, 2003, p. 176)

The digital world adds the virtual dimension that obliges, in order to understand it, to add the movements of *involuntary logic* and *physiological mechanisms*, to cognitive *processes* and those related to the intention of attributing *meaning*.

CONCLUSION

The interactive digital work or design that truly appropriates electronic supports, has an organic and irregular, random arrangement, whose compositional support is a structural map in which the viewer will decide the circulation and the rhythm of his approach, a non-linear, non-cycled, open flow. No one can claim that the perceiver is above or below the work, he is only there. This puts an end to the traditional circuits of production, distribution and consumption and the terms of commercialization of the work are diluted in favor of the idea of the globalization of culture, art becomes the property of whoever has access to the technology in which the work is inserted.

The most important thing is the new character that the meaning of artistic creation presents when confronted with the alternatives of electronic plastics: interactive electrography, virtual museums, conditioning of interfaces, all of which forces us to deepen our knowledge and masteries of new technologies that broaden the horizons of visual culture and artistic *practiceWhose possibilities of plastic expression have been infinite since the very beginning of its history*, technology only puts at the service of the artist alternative resources that add and interrelate to the other practices of the visual arts without substituting, demeriting or disappearing them. Here we

agree with Gombrich (2003) that visual artists should not be puppets of new technologies, a commonplace that is tried to be confirmed as the spirit of our time, on the contrary, art and artists have the social commitment to contribute to the creation of visual paradigms that are above the falsehoods and distortions that the reflections of digital simulation promote.

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