

# SYNESTHESIA AND DIGITAL PERCEPTION<sup>1</sup>

Sérgio R. Basbaum  
Pontificia Universidade Católica, São Paulo (PUC-SP)  
sergiobasbaum@pucsp.br

## **Abstract:**

Perceptual habits in Western Culture, from the Greeks to the 17th century, operated through a synesthetic approach to reality. Modernity separated the senses and Modern Art has operated through this logic. Contemporary digital culture, however, seems to be returning to older models of perception, in many ways synesthetic. This article attempts to define some aspects of the synesthetic experience, briefly tracing some cultural historical references, to propose a concept of *digital perception* -- the mode of contemporary experience fostered and supported by digital technological apparatuses.

**keywords:** synesthesia, perception, digital, art, technology, culture

## **I. Synesthesia**

The word "synesthesia" originates from the Greek: "syn" (simultaneous) and "aesthesia" (sensation), meaning "simultaneous sensations" – unlike "anesthesia", or "without sensation". For the past decades, I have been working on concepts concerning the relationship between synesthesia in art, technology and perception. The first mention to the term "synesthesia" is usually attributed to Pythagoras' Harmony of the Spheres, which, among other things, implied sensory fusion. Its most common usage in art dates from the Symbolist poetry of the 19th century – Baudelaire, Rimbaud etc.. However, there is a true lineage of artworks and propositions, whose origins can be traced back to the 18th century, which share common synesthetic aspirations, despite distinct socio-cultural and technological contexts that can be described during this period.

---

<sup>1</sup> Originally presented in the 3rd Subtle Technologies Conference, in Toronto, the present article is a revised version of that speech. Although it's first version has been written in 2003, it contains most of the directions developed in my work in the last 12 years.

Synesthesia also has a fascinating history in the domain of science – psychology, physiology, neurology, etc.. Since at least three centuries there have been reports describing people who, exposed to a stimulus related to a certain sensory modality, experience a sensation in a different modality. In the 19th century, the possibilities of interlinking among the senses were the subject of a great number of works, especially after 1870. Due to the rise of behaviorism, after the 1930's one can observe a significant decrease in the amount of scientific works relating to the topic. In the past decades, however, the progress in neuro-cognitive sciences, and research about the brain and consciousness assisted by technological resources, have made possible to observe brain processes which were previously unobservable, sparking a new wave of interest for synesthesia and for what it can reveal about mind, brain and cognition. One can then find works of Marks (1974; 1987), Cytowic (1989; 1993), Harrison and Baron-Cohen (1997), Harrison (2001), Grossenbacher (1997), Ramachandran And Hubbard (2003), Robertson And Sagiv (2004) and many others. The term has also appeared with increasing frequency in literature dedicated to contemporary culture (Marshall McLuhan, 1995; Eric McLuhan 1998), to the visual arts (Moritz, 1985), color (Riley II, 1995), anthropology (Ackerman, 1990), linguistics (Day, 1997, 2001), music (Kahn, 1999; Bosseur, 1999), literature (Nabokov, 1966) and even multimedia (Cook, 2000). It even deserved an Oxford Handbook edition dedicated to the subject (Simner and Hubbard, 2014). In 2002 I released a book, in Brazil, on own my studies about synesthesia and art. In the last decade, the term synesthesia has also appeared in magazines, newspapers, radio and television. In the Internet, several international forums have communities dedicated to the theme. In October, 2015, in Miami, the 11th meeting of the American Synesthesia Association took place, and Fundación Internacional Artecittá supports a Sinestesia, Ciência y Arte meeting which had, in 2015 it's 5th edition. Other similar events take place every year in different locations, bringing together synesthetes and researchers from many different areas. In what follows, I'd like to point out under which aspects synesthesia seems to correspond to the contemporary perceptual experience, and to propose the concept of digital perception, which I regard as largely synesthetic.

## **II. A singular experience**

First, I would like to briefly return to mind and brain research. When I began my work, I've dedicated some time to several theories which attempted to explain synesthesia. Later, however, I have focused my attention on the aspects of the synesthetic experience that can be extracted from those works. Being synesthesia a subject of quite recent research, the transitory aspect of scientific truth must be taken in account here: explanations will likely change along the coming years; whereas the descriptions of the experiences of the so-called synesthetes are the starting point of all these researches and the point which they all converge upon.

In *The mind of a mnemonist*, Alexander Luria describes how his patient S., endowed with an exceptional memory and a also synesthete, described the experience of listening to film director Serguei Eisenstein's voice:

"(...) You know there are people who seem to have many voices, whose voices seem to be an entire composition, a bouquet. The late S. M. Eisenstein had just such a voice: listening to him, it was as though a flame with fibers protruding from it was advancing right towards me. I was so interested in his voice, I couldn't follow what he was saying... (...)"(LURIA, 1986, 24)

Testimonies like this one – and they are numerous – lead neurologists and neuroscientists to quest the very nature of our perception. In evolutionary terms, human being's different perceptual modalities are interrelated by a number of factors. The construction of a conscious and coherent reality circumstance, indispensable to survival (Grossenbacher, 1997), depends on the dialogue between these different modalities. The senses confirm each other and we have faith in the world – thus, we act efficiently within it.

This dialogue can be thought of in three directions. The first is physiologic: Lawrence Marks (1997) shows that our perceptual modalities share some common dimensions. For instance, discontinuous stimuli in frequencies above 20Hz applied to the visual, auditory or tactile fields give us an illusion of continuity – the illusion of movement in movies, the sensation of continuous sound or of a continuous pressure. Low-pitched sounds seem to be wider and darker; high-pitched sounds, smaller and brighter. These dimensions allow sensations specific to a modality to be described in terms of another modality. We refer spontaneously to a *harsh* sound or a *screaming*

color; we describe a pleasant voice as a *sweet* voice<sup>2</sup>. These dimensions seem to be, above all, biological properties of the perceptual apparatus.

Secondly, these associations may also reveal supposedly universal aspects of experience. The Pythagorean Harmony of the Spheres, the golden ratio, Jungian archetypes and even Peirce's phenomenological categories, for instance, propose structures or qualities that permeate the entire human experience. In this sense, Cytowic (1993) suggests that the pleasure provided by firework displays relies on the way by which they (re)present essential structures of our perception, Kluver's *form constants* – perceptual archetypes, it could be said. Thirdly, there's the cultural aspect: each culture determines its own perceptual habits, to which associations among senses also respond – whether in the way we hope that an orange flavored soft drink should be orange in color, or whether we refuse to believe that a wine-colored, scentless and flavorless substance can have the same scent and flavor of a cup of regular drinking water (Morrot et al, 2001).

The experience of the synesthetes allows us to examine these processes more closely. For them, cross-modal associations are noticed in a more intense way, emerging in the form of a sensation, with common qualities and idiosyncrasies. Neural and psychological studies allow us to state that the synesthetic state of perception, or at least a more intense state of modal crossover, is typical of childhood (for example: Marks, 1997). Synesthesia is a natural property of the perceptual system of newborn babies (Maurer, 1997) and is more easily found in children. Moreover, the state of fulfillment through sensation, or losing yourself in sensation (as opposed to reason), can be related to a cognitive mode of childhood, where the here-and-now of sensation prevails over the durable symbolic universe, typical of verbal cognition. Our increasing 'conversion' to the more 'flexible', practical, rational and efficient universe of the symbolic, places words between us and the world.

It doesn't matter how distant we are from a direct experience, however. Cross-modal associations can still be found in ordinary language – as metaphors exemplified above demonstrate. Although language is simultaneously representational and creative,

---

<sup>2</sup> On synesthesia and synesthetic metaphors, see Day (1966)

allowing for games and paradoxes, generating new meanings which exceed the biologic modal crossings, these are in the basis of our cognition and, it has been suggested, in the origin of language. Following Marshall McLuhan, Eric McLuhan (1998) presents language as a culture's "perceptual treasure".

Thus, we're ascribing certain properties to the synesthetic experience: it appears to us as a pre-verbal direct experience of the world; an immersion in sensation, as opposed to an analytical, rational experience; a specific experience of time, a *nowness*, a here-and-now time – almost as delay, a time dislocated from the diachronic linear time of ordinary experience. So, being opposed to decisive aspects of our analytical consciousness, synesthesia presents itself as a particular form of consciousness, a particular *gestalt*, a structuring of the world that provides a different cognition – which the synesthete experiences and appreciates but is not able to express. Such qualities lead Cytowic (2000) – in a surprising twist – to compare the synesthetic experience to spiritual ecstasy, as described by William James in *Varieties of religious experience*.

### **III. A world of sensation**

Kandinsky, in 1910, while giving his definitive step toward abstraction, states:

"(...) lend your ears to music, open your eyes to painting and... stop thinking! Just ask yourself whether the work allowed you to 'walk about' into a hitherto unknown world. If the answer is 'yes', what more do you want? (...)"  
(Kandinsky, 1910, apud Cytowic, 2000: 56)

If we look at aesthetic experiments which aspire to the synesthetic, it is possible to outline some patterns. Most works make use of the fusion between sound and color, from which, for example, French priest Louis Bertrand Castell in the 18th century conceived the first color-keyboard. Searching for a "music of colors", and inspired by the writings of the restless Jesuit priest Athanasius Kircher, Castell sets in motion a long-lasting union between spirituality and synesthetic poetics, which will be reiterated in the centuries thereafter. By compiling works usually associated with synesthesia –

and which have gone, under their synesthetic aspect, practically unnoticed in the dominant aesthetic discussions of the last century –, we may find, in the works of Castell, Scriabin, Kandinsky, Thomas Wilfred, Oskar Fischinger, Olivier Messiaen, John and James Whitney, Jordan Belson, Ron Pellegrino, Jorge Antunes (and many others), all forms of discourses and spiritual practices acting as the driving forces of their artwork. Christianity, theosophy, anthroposophy, Buddhism, Zen, Rosae Crucis, Sufism... It is of less importance which doctrine was chosen by each artist because we find, again and again, the connection between synesthetic and mystical experiences, suggested by Cytowic, reiterated by the works and discourse of those artists. Immersion into sensations, abandonment into the instant and a-rationality equally punctuate the meanings established by most of these works.

That any of these artists may be a synesthete is irrelevant. While aspiring to sensory fusion in different ways, they've created powerful representations of such unity, synesthetic signs that demonstrate an extraordinary coherence with the reports of synesthetic experience. While evoking one sense in terms of another, as Kandinsky or Messiaen did, or through the deliberate fusion of sounds and abstract images, as Fischinger, Whitney, Belson or Pellegrino did, synesthetes and non-synesthetes seem to have as a reference the same cognitive experience. They describe a kind of dynamic kaleidoscope of sounds and abstract images – fires, photisms, colors, angular forms, sensual fogs – superimposed in different movements, creating interfaces of sensation which can lead as much to the synesthetes as to the artists.

### **III. Acoustic Space**

In Classical Antiquity, relationship between man and world around him seems to have been understood as mediated by a kind of integrated block of sensation, all senses relating themselves to each other, as well as to superior models of nature and Universe. In Pythagoras's Harmony of the Spheres, for instance, the entire sensitive world is an expression of the same mathematical unity. Two centuries later, Aristotle also affirms the unity among the senses in his *De Anima*. Such an understanding stood unquestioned up to two centuries ago.

Greek philosophy holds a great influence in the medieval world. Not only Aristotelian thought, but also the Harmony of Spheres – through Boetius – strongly influences Scholastic thinking, and the entire symbolic production of medieval Christian culture expresses this mathematical unity among the senses: music, painting, stained-glass windows or architecture emanate from a same superior harmony, a divine unity (Bosseur, 1999).

It is possible, however, to more clearly outline the relationship between synesthesia and medieval perception of the world through Marshall McLuhan's understanding of medieval culture as oral culture – in which knowledge is a collective good, the notion of individuality is not yet clearly defined, and unity and meaning are divine determination. McLuhan associates oral cultures with qualities of tribal worlds, opposing these to the culture raised in Europe after Gutenberg's typography.

"(...) Before the invention of the phonetic alphabet, man lived in a world where all the senses were balanced and simultaneous, a closed world of tribal depth and resonance, an oral culture structured by a dominant auditory sense of life (...)" (MCLUHAN, 1995: 239)

a perceptual bias thought of in terms of his *acoustic space* concept:

"(...) space that has no center and no margin, unlike strictly visual space, which is an extension of the eye. Acoustic space is organic and integral, perceived through the simultaneous interplay of all the senses. (...) The man of the tribal world led a complex, kaleidoscopic life, precisely because the ear, unlike the eye, cannot be focused and is synesthetic rather than analytical and linear. Speech is an utterance, or more precisely, an outing, of all our senses at once; (...)" (MCLUHAN, 1995: 240).

Acoustic space corresponds to a specific experience of time: unlike narrative time – diachronic, measurable according to the mathematical determinations of the clock, which has been built during Modernity – medieval time is measured in terms of the divine calendar: seasons, crops, dawn and sunset. Vilém Flusser (1998) also attributes to writing the linearization of thought and historicity, in such a way that the experience of time in this oral world is the same Flusser ascribes to imagerial thought – the experience of *magic time*. It would be a mistake to understand Flusser's imagerial

and McLuhan's oral as opposed: it is a question of opposing the world which set in motion by the rational, organizer, linear printed verbal discourse, to one which installs an essentially circular temporariness. The time of oral cultures is a-historical; its space is acoustic; its world theocentric, magic; the man-world relationship, not mediated by texts. These are qualities that we've just above attributed to the synesthetic experience.

Medieval synesthetic culture will be disassembled by a set of forces that culminate in the so-called Renaissance. But, while Modernity establishes its path – and, with it, the primacy of reason over faith, the genesis of classical science, the increasing autonomy of the work of art and, especially, the constitution of the individual as a "subject" – its unity of senses will be preserved even through radical transformations in culture.

For McLuhan – as it is well known –, but also for Flusser, these transformations develop from Gutenberg's invention of print, which allowed a scale of reproduction of linearized thought, into verbal printed language, unimaginable before. The result is the primacy of vision over other senses and the end of the perceptual balance of the oral world, "translating its organic harmony and complex synesthesia into the uniform connected and visual mode that we still consider the norm of 'rational' existence." (MCLUHAN, 1995: 240-241)

This dissociation among senses, however, took some time to constitute an operative cultural mode, noticeable in the testimony of perception rendered by arts. Visual arts, for instance, achieves one of the most remarkable shifts that constitute the Renaissance world, with the development of central perspective in the 15th century. While transferring the organizer point of view to the subject, central perspective also transfers the attribution of the meaning of the world, which before belonged to the divine order, to human consciousness. In the words of Panofsky (1991:72), perspective is a symbolic form, that marks "the sign of an ending, when antique theocracy crumbled", and "the sign of a beginning, when modern 'anthropocracy' first reared itself". In other words, a structure that sustains the transition between these two worlds.

However, it would be a mistake to believe that the full inheritance of the medieval world could be swept away in a single blow, solely by the establishment of a vanishing point that ascribed human unity to a previously discontinuous space. The Renaissance world manages medieval inheritance and postulates neither an autonomous

vision of other senses, nor an observer dissociated from the cosmos: to know is still a process of identification with a magic and organic world filled with divine meaning (Crary, 1999). So, in McLuhan's understanding, what is accomplished by perspective, while attributing a three-dimensional illusion to space, is precisely the transference, to visual representation, of the qualities of acoustic space which molded the medieval European culture.

#### **IV. Touch me with your eyes**

This perspectival space, simultaneously visual and deeply acoustic, has been dominant for about four hundred years. Along the 17th and 18th centuries, we observe the consolidation of Gutenberg's Galaxy, and those that McLuhan considers its side effects – primacy of vision, national state, individualism, rationalism, classical science, etc.. A new and unique kind of man-world relationship, the modern subject, emerges from this process. Jonathan Crary (1999)<sup>3</sup> describes it as the subject of the *camera obscura* – a technology of observation that is both an instrument that is used and a metaphor for knowledge. An idealized observer is delineated – transcendent, separated from his own body and fundamentally different from the nature and the universe that he observes and maps systematically and fragmentarily. However, if what was formerly identification becomes a science founded in the efficiency of des-identification and objectification of the empirical data – thanks to Descartes and Newton – it is important to remember that Newton still had strong ties with medieval alchemic tradition. The unity of senses, “a common surface of order”, as Crary puts it, constitutes the ballast of reality of such an idealized subject, almost-divine, in its relationship with a world still connected to magic. Senses constitute a single fabric of sensation, which is inconceivable unless the nature of these senses, which are eventually different, can be compared to each other (through reason) so that they can be understood. We have reports such as Locke's about a blind man who describes the color red as having the sound of a trumpet; or Condillac's, whose statue receives the senses one by one, to constitute a consciousness of the world only when the process is completed. In this

---

<sup>3</sup> Many of the views here assumed about perception in XVII to XIX centuries derive from Crary's referential work.

process, perspective remains untouched, as a space of stable representation which guarantees unity and homogeneity to the world.

Some images offer testimony about the relationship between the senses during this period, especially those of touch and vision. In the 1724 edition of Descartes' *Dioptrics*, vision is presented through the image of a blindfolded man who feels his way through the world with the use of two sticks; Svetlana Alpers (apud Ackerman, 1995:94) describes two blind men images by Rembrandt – *The blind man Tobias* (1651), or *The prodigal son* (1669) – as a way of “calling attention to the activity of touch (...) as an embodiment of sight”; Crary (1999: 64) makes a remarkable analysis of Jean-Baptiste Chardin's *Boy blowing bubbles* (1739), stressing the form in which “vision and touch work cooperatively”, revealing a thought for which “haptic and optical are not autonomous terms, but constitute an indivisible mode of knowledge.”

## **V. Fragments from the book of machine**

In the very fall of the 18th century, Goya, in his *Caprice 50 – Los chinchillas* (1799), presents two men wearing straitjackets and padlocks in their ears. For the British critic Guy Brett (2001), this image clearly expresses the denial of the body by the subject of the *camera obscura*; we could speak, in the same sense, about the loss of direct experience of senses as result of the domain assumed by the book in the mediation of the man-world relationship – in fact, Goya painted the *La lectura (Men reading)*, 1820-23). I would like to suggest a more precise analysis, however. What Goya seems to be showing to us, when he places such padlocks in the ears of his characters, is the definitive end of oral culture – the medieval space that had, for four centuries, immanently resisted embedded in the space of central perspective.

For a number of reasons, through different angles and different authors, the key word for the 19th century is fragmentation. Let's take, as does Coli (2002), the example of bodies in neo-classic painting, from Gericault or Ingres, made under the inspiration of Zeuxis's parable: beauty is created from the most beautiful fragments of nature; same for monsters, like Mary Shelley's *Frankenstein*. For different thinkers such as Siegfried Krakauer, Vilém Flusser or Karl Marx, the 19th century produces a fragmented man and a fragmented culture.

Behind fragmentation stands, on the one hand, the reification of the operative logic of classical science, through the integration of the machine to the daily landscape; on the other hand, the application of its singular method – "to divide and to conquer" – to the human body: placed in a biological body, with instincts, reflexes and desires, the transcendental subject becomes for the first time his own object, a body which emerges as an active organism, producer of its own sensation. Modern physiology and neurology have their origin here: neural networks are unveiled; a distinct neural apparatus is ascribed to each sense; cognitive and motor functions are for the first time assigned to specific areas of the brain. In philosophy, this process is well represented by Schopenhauer's work, whose philosophical effort departs from physiological knowledge of his day to propose a form of perception which surpasses human being's animal facet, to reach transcendence.

This newborn neurophysiological research presents a double character: it provides perception with a biological basis in which the body appears more and more as producer of illusions, establishing the possibility of a reality of specialized and autonomous sensations, without a referent in the real world; and from this autonomy of sensation are born, for example, the kaleidoscope as well as propositions commonly associated to modern art, like John Ruskin's "innocent eye". Simultaneously, in a landscape now defined by the productive logic of the machine, it allows the progressive mathematicalization and quantification of the subjective experience, which will give support to control mechanisms of efficiency and productivity – like those of Pavlov, Skinner and cybernetics.

As a counterpart of a perception which is autonomous with regard to the referent, it is the referent itself which rebels: with the train, the steam-powered machine, the incessant flow of goods, the consolidation of a capitalist logic that turns everything into processes of change and negotiation, European society undergoes transformations in a rhythm until the unknown: reality becomes volatile, ephemeral, unattainable through contemplation, intangible – eliminating the final traces of pre-capitalist society. In this sense, photograph, the first of the mechanical techniques of image production on a large scale, is a symptom of the need to apprehend an instant that escapes, separating haptic and optical into experiences of different temporariness and spatiality.

As it becomes contingent on the biological materiality of the body, the subject, previously ideal and transcendent, experiences an unusual crisis throughout the 19th century. While the triumph of mechanicism, manifest in the industrial revolution, elects the machine as the metaphor of the whole universe, the subject, turned into its research locus, submits the clarity of reason being to all sorts of embarrassments: the increasing affirmation of sensation, its autonomy in relation to the referent, the opacity to which biological contingency relegates the observer, and, finally, its fragmentation by this same science – the triumph of science over faith, the Darwinist theory and finally, the elimination of tradition in a re-inaugurated world, made volatile by technological apparatuses – lead to a crisis of the subject, in whose ends are, in the streets, Jack the Ripper; in the books, Dr. Jekyll and Mr. Hyde; and, in science, Freud and psychoanalysis.

While science fragments the body, autonomises and specializes the senses, art seeks its new place in a reinvented society. It flirts with all kinds of spaces suggested by subjective vision, binocular vision, or by the light projected into the retina. Finally, when it turns to its own undisputed territory, to the experience that is unique to it, it becomes Modern Art. When it chooses a purely visual character, it becomes flat: acoustic space disappears.

## **VI. Entr'act: the empire of the eye (for your eyes only)**

It is less relevant that Kandinsky and Schoenberg bring about in their works a particular character which today may be thought of as synesthetic. For that reason, key theoreticians of Modernism, like Greenberg or Boulez, have considered them tied to the past, contaminated by values of Romanticism – they insist on representing something that is out there in the world: the soul. The essential feature of modern music and painting is their self-referencing, their autonomy in relation to the world, their vocation for the autonomous experience of a single sense: painting, for the eyes; music, for the ears. Modern art constitutes a kind of a semiotic machine that expands enormously the semiosphere, but excludes, in the strength of its operative logic, body, narrative, representation, the world: at last, it becomes hollow. When these processes exhaust themselves, everything that had, since Goya, remained exiled on behalf of specialization, of purity, of the rational and fragmentary realignment of the world,

returns. The world to which such images return, however, is no longer that of nature: it is the one of mass-media; and we start noticing words like “inter-media”, “mixed-media” and hybridisms of all forms; we observe the return of the body, which claims its integrity, its temporariness, and the direct experience of senses. But we also have a new technology – the digital one.

## **VII. Digital perception**

We have traveled a long way. Just above, we attributed certain qualities to synesthetic experience. In addition to associating synesthesia to a direct experience, a-rational, non-mediated by language, which seems to share certain similarities with states of consciousness that our culture classified as spiritual or mystic, we have also attributed to it a specific temporariness and spatiality: a nowness of time; an acoustic space. We have also talked about McLuhan, and it is useful to remind ourselves that, in the core of his thought, is the idea that technologies, while imposing a reorganization of our senses, shape the way by which we organize thought and knowledge.

I would like to suggest that it is not a coincidence that digital technology is directly implicated in synesthetic representation processes recovered with the end of modernism. It is out of question to state that this sensitivity is only present in digital art: the work of Brazilian artists such as Lygia Clark and Helio Oiticica, who subvert modern notions of authorship, work and fruition through several interactive and multi-sensory experiments, also flow in that direction, as well as many other artists who appear by the late 1950's and early 1960's. It is not coincidental, however, that the poetics of Clark and Oiticica take place in a Brazilian context, a culture that has never been Gutenbergian – unified by radio and popular music, Brazil was and is still marked by strong traces of oral culture. At the same time, it is impossible to ignore the advent of television when one thinks about the out-centering of the artistic circuit represented in the dialogue performed by Clark and Oiticica from an outlying country, or in the return of world images in pop-art, or even Nam June Paik's performances and video pieces.

However, what is now being outlined brings traces of that which will be molded by digital support. The dream of sensory fusion originating from technological

possibilities goes back to Castell. The inventors of color-music apparatuses in the 18th and 19th centuries, and even Scriabin, already in the 20th century, have faced, it is easy to imagine, incipient technologies for the implementation of their synesthetic desires; while adhering explicitly to the dynamic and logic of modern world, futurism also sustains the dream of synesthetic experience from the possibilities technology creates. Thus, it is natural that artists such as John Whitney or Ron Pellegrino, who, through different paths arrive at the concept of visual-music, already view the tools of digital technology in the 60's, as means for the liberation of poetical worlds which they previously considered incomplete.

Digital processing, since its establishment, has been a means to duplicate and simulate – we could even say: clone – reality, as a way of foreseeing, anticipating, understanding and controlling it. It also becomes a means of expanding this reality, but this expansion corresponds to specific modes of perception and representation. When we take, for instance, vision automation procedures developed for military use after the Second World War, we notice that three-dimensional analysis of image is implemented through the information of a flat image generated according to the codes of perspective, plus the data supplied by a radar sign which touches the object and returns to the device, allowing distance calculation (Manovich, 2002). While mixing vision and touch in a perspectival space, we are back to the model of vision practiced in the 18th century.

But the flood of digital images and works in the last decades also marks the return of three-dimensional and acoustic spaces, in a vast number of works involving virtual reality and three-dimensional immersion environments – frequently filled with sounds that reiterate the illusion of space. However, the connections between synesthesia and the digital culture reach even beyond that.

While codifying all senses from a common mathematical code, we go back to Pythagorism. Thus, it is not surprising that John Whitney's digital harmony will mix colors and sounds from the mathematical proportions of musical harmony, whose origins go back to Pythagoras. Or that Ron Pellegrino<sup>4</sup> composes laser and sound animation works in explicit dialogue with the Pythagorean tradition. Translation of data

---

<sup>4</sup> In 2001, Ron Pellegrino sent personally two DVDs with laser-sound performances named *Pythagoras and Pellegrino in Petaluma*. Those works, which I consider remarkable and unique, have never been released commercially. Some of these works, with their complex images and electronic sounds, surfaced – and can be watched – in youtube, under the name *Emergent Music & Visual Music Studies*.

of a sense in terms of a different sense through the mathematical mode of an algorithm can be found in a vast number of software, interfaces, corporal sensors or immersive environments which aspire to different synesthetic registers. As a result, they point to the type of experience of nowness that we have recently defined. Its non-linear character stands apart from the qualities of verbal thought, its temporariness is circular. Even in virtual reality games, which have narrative aspects, the character of immersion in experience is still the most decisive.

Digital culture has rendered a remarkable acceleration of our world. Those we call environments of immersion are only distinct spaces within a larger environment of a planetary culture in which we are more and more immersed in the instant: the notion of historicity dissolves in the circularity of the synesthetic instant; the experience of narrative time and contemplative visual space dissolve in sensation. We are, again, in a magic world, where all kinds of metaphors and mythical spiritual discourses of our experience emerge – Roy Ascott's *shamanism*, or Erik Davis' *Tech-gnosis* are only two among many examples. These aspects, essentially synesthetic, of our contemporary experience, are what I call digital perception.

(May/June, 2003 – revision December/January, 2015/16)

#### **REFERENCES:**

ACKERMAN, Diane: A natural history of the senses. New York: Vintage Books, 1995.

BARON-COHEN, Simon and Harrison, John E. (eds.) : Synaesthesia: classic and contemporary readings. Oxford: Blackwell Publishers, 1997.

BASBAUM, Sérgio: Sinestesia, arte e tecnologia - fundamentos da cromossonia. São Paulo, Annablume/Fapesp, 2002

BOSSEUR, Jean-Yves: Musique et beaux-arts - De l'Antiquité au XIX siècle. Paris, Minerve, 1999.

BOULEZ, Pierre: Homenagem a Webern. In CAMPOS, Augusto: Música de Invenção. São Paulo: Perspectiva, 1995.

BRETT, Guy: Lygia Clark: seis células. In BASBAUM, Ricardo (org): Arte contemporânea brasileira. Rio de Janeiro, Contracapa, 2001.

COLI, Jorge: O fascínio de Frankenstein. MAIS! No 538. São Paulo, Folha de São Paulo, 2/junho/2002.

COOK, Nicholas: Analysing musical multimedia. Oxford University Press, 1998.

CRARY, Jonathan: Techniques of the observer - on vision and modernity in the XIXth century. Cambridge: MIT Press, 1999.

CYTOWIC, Richard E.: Synesthesia - A union of the senses. New York: Springer-Verlag, 1989. The man who tasted shapes. Cambridge, MIT Press, 2000.

DAVIS, Erik: Techgnosis - myth, magic and mysticism in the age of information. New York: Harmony Books, 1998.

DAY, Sean A.: Synaesthesia and Synesthetic Metaphors. Psyche; volume 2, number 32; July. <http://psyche.cs.monash.edu.au:80/v2/psyche-2-32-day.html>

FLUSSER, Vilém: Ensaio sobre a fotografia - para uma filosofia da técnica. Lisboa: Relógio d'água, 1998.

GREENBERG, Clement: A pintura moderna. In BATTCKOCK, Gregory: A nova arte. São Paulo: perspectiva, 1986.

GROSSENBACHER, Peter G.: Perception and sensory information in synesthetic experience. In HARRISON, John E., BARON-COHEN, Simon: Synesthesia: an introduction. In BARON-COHEN, Simon and Harrison, John E. (eds.) Synaesthesia: classic and contemporary readings. Oxford: Blackwell Publishers, 1997.

KAHN, Douglas: Noise, water, meat - a history of sound in the arts. Cambridge: MIT Press, 1999.

LURIA, A. R.: The mind of a mnemonist. Cambridge: Harvard University Press, 1987.

MANOVICH, Lev: Modern surveillance machines: perspective, radar, 3-D computer graphics and computer vision. In LEVIN, Thomas Y., FROHNE, Ursula e WEIBEL, Peter: CTRL + Space - rethorics of surveillance from Bentham to Big Brother. Karlsruhe: ZKM - Center for Arts and Media, 2002.

MARKS, Lawrence E.: On colored-hearing synesthesia: cross-modal translations of sensory dimensions. In BARON-COHEN, Simon and Harrison, John E. (eds.) : Synaesthesia: classic and contemporary readings. Oxford: Blackwell Publishers, 1997.

MARKS, Lawrence E., HAMMEAL, Robin J., BORNSTEIN, Marc H.: Perceiving similarity and comprehending metaphor. Monographs of the Society for Research in Child Development, 1987, vol. 52 (1, serial no. 215).

MAURER, Daphne: Neonatal syneathesia: implications for the processing of speech and faces. In BARON-COHEN, Simon e HARRISON, John: Synesthesia – classic and contemporary readings. Oxford: Blackwell Publishers,1997.

McLUHAN, Eric: Electric Language. Toronto: St. Martin´s Buzz, 1998.

McLUHAN, Herbert Marshall: Essential McLuhan (Edited by Eric McLuhan and Frank Zingrone). New York: Basic Books, 1999.

MORROT, Gil, BROCHET, Frederic e DUBOURDIEU, Denis: The color of odors. Brain and Language. doi:10.1006/brln.2001.2493, available online at <http://ideallibrary.com>

PANOFSKY, Erwin: Perspective as symbolic form. New York: Zone Books, 1991.

RAMACHANDRAN, Vilayanur S. and HUBBARD, Edward M.: Hearing colors, tasting shapes. Scientific American: [http://www.sciam.com/print\\_version.cfm?articleID=0003014B-9D06-1E8F-8EA5809EC5880000](http://www.sciam.com/print_version.cfm?articleID=0003014B-9D06-1E8F-8EA5809EC5880000) 2003.

RILEY II, Charles A.: Color Codes - modern theories of color in philosophy, painting and architecture, literature, music and psychology. Hanover: University Press of New England, 1995.

ROBERTSON, Lynn C.; SAGIV, Noam (Eds): Synesthesia: Perspectives from Cognitive Neuroscience. Oxford: Oxford University Press, 2004.

SIMNER, Julia; HUBBARD, Edward M.(Eds): Oxford Handbook of Synesthesia. Oxford: Oxford University Press, 2014.