

TECH ART

**The effects of code and network systems
on music and art**

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2004

www.newtoy.org

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ABSTRACT

The information age, when all can be reduced to ones and zeros, is a time of reconstruction of creative fields. It is a time when retrospection of the past's metaphysical paradigms gives a background and in some cases a foreground of today's actuality. The process of progress we are going through at the moment seems inevitable in many cases, as if we are on a conveyer belt fleeting past astonishing gadgets, biotechnological revelations, and wireless wizardry. The art world is participating in this perpetual process and producing some very interesting results. In this paper I intend to find the thread that binds past beliefs and practices with the ever-increasing pliability of technology of the present and use it to interpret current artistic progress. Although the subject is a very large one and it is not possible within this paper to go into the details of every topic mentioned, I do intend to mention at least some of the relevant issues that contribute to new perceptions of sound and arts. In the first chapter I will have a look at Gnostic ideas in the past and their current expressions. The idea of Gnosis is essentially using an open source structure to explore the unity and ideas that underlie the being of things with the intention of arriving at spiritual enlightenment and knowledge. In the second chapter I will explore the scientific and metaphysic research into the idea of networked systems and connectivity. These are a fusion of Gnostic ideas with scientific ones and are expressed in musical and artistic creation. In the third chapter I will apply the findings from the second chapter on music composing models and will explore the implementations and development of different codes as tools for sound composing. The fourth chapter will then focus on interactive art and Net art as artistic implementations of the aforementioned networked idea and as a natural expression of an elemental feature of vivisystems. I am inspired by the two seemingly contradicting trends of our age. First, the growing homogenisation of consumer culture as well as music culture that creates a standard of musical elements and can be seen as the digital age's reincarnation of the common elements heard in old folk music throughout the world in ancient times. Second, the distribution and fragmentation of sources and outlets as fertile concepts onto which evolve new structures and ways of perceiving things. I will present these trends and their foundations and tie them with current artistic development.

CHAPTER ONE: GNOSIS

Human quest for knowledge has its roots several millennia ago when people interpreted the sky and the stars, mapped them, timed their cycle and named them. Gods and Goddesses were created to mediate between the individual/society to the elements of nature and in a roundabout way endow people with control over nature's chaotic whims by providing a rational story to explain them. Hermes, the Greek messenger god is the mythological entity that symbolised the mesh of interconnectivity between people and between the gods. "...with his mischievous combination of speed, trickery and profitable mediation, he [Hermes] can almost be seen as the archaic mascot of the information age" (Davis 1999:14). In Greek mythology, Hermes's relationship with Apollo, the god of truth order and purity, can be seen as the continuous challenge science faces in its attempt to impose truth and order on the unpredictable chaos and nature's tricks.

The written word became an extremely efficient and accurate method of dissecting the perceived world into objective units of rationalism. It corresponded with Plato's theory of forms which points out that another world exists beyond the realm of perception, a world whose objects we cannot see and whose truths can be recognised only through reason. The letters resembled the insubstantial reflections of those truths, with them one could dissect one's own personality or as Eric Davis puts it: *"For once the writing machine is interiorised to some degree, it can serve both as the most abstract and most intimate of mirrors; with it (literally) in mind, the self can reflect upon itself, sharpening the scalpel of its own introspection and setting itself against the external world."* (Davis 1999:27). This literal rationalism was an important milestone in the human process of the realisation of hidden and desired aspects of its individual and collective psyche. In effect the alphabet was the first major cybernetic technology. First believed to have developed by Sumerians and then spread like a virus throughout the Western world by the Phoenicians, it soon became the medium to deliver the word of God and powerful enough to invoke the spiritual self. The word in itself became sacred and worshipped. Egyptian Hieroglyphics tell us that the Word creates all things "...the totality of being. Nothing *is* before it has been uttered in a clear voice" (Seligmann 1975:76). It is no coincidence that Thoth was the Egyptian god of magic *and* inventor of language. Success of magical incantations relied on the exact delivery of the words their

rhythm and melodies. In Jewish faith, the name of god can only be read and not uttered and the letters of scriptures of the Torah have an almost fetishist appeal to them. They are inscribed with marks around them to indicate to the one who reads aloud the melody intended to accompany the read and so a word reflects both musical notation and meaning.

Plato's metaphysical cosmology exerted an enormous influence on Western culture's continuous attempts to transcend the caged spirit towards the haven of the unearthly, the godhead. While Catholicism insisted that man was born into sin and would redeem himself and transcend the fleshy manacles into salvation only through dying a life lived by following a strict code of Do's and Dont's; Gnostics believed that only by seeking new knowledge, experimenting with all found technologies, and alchemy of the soul can the divine intelligence illuminate in the self. A cocktail of occult, Egyptian and Christian mysticism can be found in the *Hermetica*, thought to have been compiled and composed by Hermes Trismegistus in the fourth century C.E. The *Hermetica* suggested that the universe is linked in a network of stars, bodies and spirit and that all who wanted to tap into any part of the network had to use the different found elements in a certain way to attain divine knowledge. From a translation of the first tract of the 18 tracts of the *Hermetica* (or *Corpus Hermeticum*) we see the recognition of a code, or Word, as a basis to the mesh of the cosmos:

But as I was in great astonishment, He saith to me again: Thou didst behold in Mind the Archetypal Form whose being is before beginning without end. Thus spake to me Man-Shepherd. And I say: Whence then have Nature's elements their being? To this He answer gives: From Will of God. [Nature] received the Word (Logos), and gazing upon the Cosmos Beautiful did copy it, making herself into a cosmos, by means of her own elements and by the births of souls. (Mead 1906)

The thread that the Gnosis used to weave different data together was mostly the use of code, language and letters. Cabalists attributed great significance to the Word, they saw in them invariable signs of thought that repeat through every sphere of existence. Everything that exists can be reduced to the Word and "...the number 1 being the most sublime and absolute manifestation of God" (Seligmann 1975:342). Peter of Abano was a scholar in the 13th century who devised a method of prophecy called Geomancy. Based on 16 different variations of dots symbolising the figures 2 and 1. Creating 8 favourable omens and 8 unfavourable omens all connected with the zodiac as well. The same numbers have been carried throughout centuries until today. Computer data is counted in a binary system on an identical base of 4 (bits to a

nybble), 8 (bits to a byte) and 16 (Hex). By looking for answers in an open-source way, that is, picking out truths from all known faiths and thought paradigms Gnostic cults promised spiritual experience rather than dogma and by that anticipated the industrial revolution. Though the building blocks of the industrial revolution relied heavily on dogma, it was a dogma of instrumental maximization.

The Renaissance period reflected in its occultism that knowledge-hungry and instrumental attitude towards the cosmos. "The Renaissance conception of an animistic universe, operated by magic, prepared the way for the conception of a mechanical universe operated by mathematics" (Yates 1964:156). The cot of scientific empiricism was built by the archetype of the Hermetic magus and his alchemical tools. Throughout magical practice whether through cryptic code as in the Steganographia by Trithemius of Wurzburg, through numerology in Kabbala, through Enochian and Babylonian incantations of John Dee and Alistair Crowley, we see the use of code to achieve a result based in personal spiritual development, communication and imagination. We can make comparisons to our age when we see the significance of the Word has transposed itself to the significance of program code. Computer programmers are the wizards of the age as they have the code to realize the creative whims of the imagination. They are, in a way, sorcerers of Magic.

Historians have been wrong in concluding that magic disappeared with the advent of 'quantitative science'. The latter has simply substituted itself for a part of magic while extending its dreams and its goals by means of technology. Electricity, rapid transport, radio and television, the airplane and the computer have merely carried into effect the promises first formulated by magic, resulting from the supernatural processes of the magician: to produce light, to move instantaneously from one point in space to another, to communicate with far away regions of space, to fly through the air and to have an infallible memory at one's disposal. (Couliano 1987:104)

Electricity was found to be a life force in itself. An erratic energy force that is caused when a current of loose electron particles travels through atoms, that can 'liberate' their electrons to the flow, from high potential to low potential obeying laws of entropy. Tesla found that a wire transmitting electrical charge affects electrical charge within its proximity revealing the nature of electromagnetic fields from a charge coil or body of electricity. A relationship between an invisible

flux and the body was thought of throughout the two preceding millennia by Chinese philosophers and healers. Chinese medicine treats the body as a grid of meridian lines that allow *chi* to flow through it. *"All things are not static and isolated but interconnected... The body is an organic integral that constantly moves. The motion of everything in the natural world is governed by the contradictory forces of yin and yang. Life is also governed by chi and there would be no life if there was no chi."* (Xuezhong 1989:3). Chinese medicine attributes the promotion of growth, nurture, development, fluid control and temperature control to chi. Emotions are a factor that affects the flow of chi, the function of the body and vice versa. Different emotions have their corresponding viscera. The overall dynamic of chi is interrelated with the elements of external nature. Western medicine is aware of an analogous activity in the body by way of the nervous system, which operates the muscles and connections between different parts of the body. The nerves transmit a small charge of electrical current that jolts muscles or other organs into action, as any biology student with a pair of electrodes and a dead frog will tell you. The human body produces an electromagnetic field that can be measured, it can be perceived by other people in the same way charged wires producing electromagnetic fields respond to each other in close proximity. The interrelation of electromagnetic fields interacts with emotions in the individuals. Since these operate on the same grid. The human body, especially in the urban environment is saturated with electromagnetic fields and radiation from electrical power grids, mobile phone radiation, radio waves, ELF (Extra Low Frequency) emanating from vehicles, all of which have an effect on bodily function. We know that every system has a resonance frequency and every system vibrates. When the oscillations of two systems coincide and resonate, large quantities of energy can be exchanged from one system to the other. This physical law in itself, also expressed in the Second Law of Thermodynamics, binds all matter and vibrations and represents the dynamic and interaction of things; Correlating to the Gnostics ideas mentioned above.

The first digital information technology appeared in 1844 when Samuel Morse laid a wire between Baltimore and Washington DC and transmitted information using a binary code of on-off charge through the wire creating patterns which were interpreted as letters. The time that followed this harnessing of the 'magic' of electricity blossomed into era of occult followings and new age like mentality. Spiritualists, naturalists, occult sciences, decadent romanticism and pop mystics grew along side technological devices such as the telephone, the phonograph, the light bulb and the telegraph. The possibility of contacting a person in a different place gave rise to mediums who contacted people from a different time. Marie Shelly's *'Frankenstein'* is a classic tale born out of

the confusion and enthusiasm of the time. The electric wires strewn about were listened to. They picked up electrical emissions from nature. Thomas Watson, Alexander Bell's assistant reported hearing crackles, snaps and random noise and thinking they might be sourced in space. Nikola Tesla, the great innovator of the time, reported hearing strangely rhythmic pulsing tones from his 200foot antenna and believing they were signals from another planet. A few years into the 20th century, the radio brought voices from the ether to the kitchen opening up the sense of perception to all sorts of voices, sounds of the unknown. In the same way that the Word opened up a new dimension of perception to the human understanding of the world around him, so did electricity and its use as a transducer of information open up a new dimension of human perception expanding the issue of 'what's real' and 'what's not' while responding to the need for transcendence to a spiritual understanding of the self. Technology replaced old alchemy in its fiddling about with all sorts of ingredients to enhance perception, understanding, and attain control over ways of nature through magic and by doing so it liberated a side of human psyche that was dormant. Erik Davis elaborating on a speech on the subject by Phillip K Dick in 1972 writes: "Scientific reductionism banished the spirits and intelligences of pre-modern cosmology from our perception of the physical world. And yet today an electronic parody of these powers has subtly come home to roost, not in the reenchanting Gaia worshiped by the Pagans, but in the media and mechanisms of the information age." (Davis 1999:187)

These days we have settled in the mindset of the Gnostics, their spiritual quest has been translated to profit and in the Western world the sign of a better society with happier individuals. Though it would be hypocritical to say that spirituality and enlightenment are the driving forces behind scientific innovations, globalisation, in its literal and pan-access to the Internet meaning, has its foundation in the ancient spiritual force that fed the Gnostics and their predecessors.

By tracing the thread of Gnostic thought throughout the ages we find that the initial idea of Gnosis has not been drowned by prevailing religious dogmas but in fact progressed and used to perpetuate humans to evolve to biotechnological and networked existence. In the next chapter I will show deconstructions of the Gnostic idea of underlying code and explore research of networked systems and adaptability in order to understand some paradigms of interaction and evolution.

CHAPTER TWO: PARALLEL SYSTEMS

Contemporary artistic development in new fields relies heavily on technology and the networking of different disciplines to the creation of an art event. In the following chapter I will survey some technological developments but more so, the metaphysics that support the idea of a network and collective systems. For it is from these ideas that current interactive and networked art extract the basic concepts for their existence.

To quote G. I. Gurdjieff, an Armenian teacher and writer who died in 1949, "Man *is* a Machine". His actions and routine are analogous to operating an electrical device. Behind every action and thought there lays an 'I', and that recognition is thought of by an 'I' as well. The human consciousness is a thick wad of layers of personas. The 'I' is plural. By crystallizing the 'I' we create a part of ourselves, which we can recognise through repetitive behavioural patterns. In what could be seen as an act of Buddhist-like or Cabbalistic psychic layer shedding, man creates extension and materialises the automated and responsive part of his mind by way of complex machines and artificial life.

Man's personal ambition to seek uniformity within his own mind extends to his ambition to create uniformity in his environment applying similar logic. We are already at a stage where the uniformity has turned to social control carried out by machines, which were devised from the most basic Platonic binary units and therefore believed to be fail-proof and true. These machines were devised from the human thought process, which is in a serial logic form. The prevailing notion of cause and effect is fundamental in human scientific logic. Hence computers were first programmed in Von Neumann's serial design. The ecology of the computed world is based on formulas extracted from observations made by scientists on how things work in nature. These formulas are imbued in animated computer graphics, CGI, the physical rules of liquid surface tension, gravity, kinetic energy, etc, are all used to replicate natural forces in artificial worlds. Yet evident from observing evolution and the body and as we know from quantum physics, nature actually works in parallel. When studying the gene pool of the common fruit fly, Stuart Kauffman, author of *The origins of order: self organisation and selection in evolution* (oxford press university, 1993), discovered that the genes work in an interdependent swarm-like way to propagate the

cellular network and steer it to its own destiny. He devised a mathematical technique, which served to track swarm systems. The traits this math technique exhibits are different from normal Newtonian math. A small input in a swarm of interdependent nodes can result in a massive output. Evolution means adaptation means solving problems when they're encountered, hence the optimal working structure of a machine; which is what prompted computer programmers and researchers to investigate the possibilities of parallel computation and evolving computers.

Stuart Kaufmann, a writer and researcher, has built network systems using computers. He has made an important discovery. After a certain threshold of connectivity between the nodes, the adaptability of the whole network freezes. Suggestive of the bureaucracy in a ridged system where every node is getting feedback from any other node. Kaufmann and colleague Chris Langton suggest that there is a certain crest of complexity that expresses the point of maximum adaptability of a networked system. This crest teeters on the edge of total chaos, where it would gridlock the network into inadaptability. This delicate balance is a characteristic of all vivisystems. Chris Langton suggests that any open-ended evolution involves a feedback mechanism that teaches the system to control the parameters that keep it surfing on the crest while self-tuning itself to higher levels of complexity. The theory sounds familiar. The hyper-connectivity and superflow of information these days is forcing a person to limit his/hers connections in order to get things done. To develop, the individual must be aware of new developments to repeatedly check the paths that lie in front of him yet avoid sponging up all the information available for that leads to stagnation. The same rule could be applied to decisions involved in compositional techniques, keeping a fresh mind about technologies and software available yet not pursuing every possibility to the end simultaneously for that amounts to chaotic stagnation and too much focus being put to the tools available rather to the actual creative input.

In his book *Out of Control* Kelly gives the example of the hive mind to illustrate the prevalence of vivisystems. "The marvel of the 'hive mind' is that no one is in control and yet an invisible hand governs, a hand that emerges from very dumb members" (Kelly 1994:16) every life system can fall under that category when dissected to its constituting parts, from the psyche to the ecology, economy, and the planet earth itself – Gaia. Evolution does not only mean problem solving but also means creating entirely new environments as nature shows us in its abundance of oddities such as pregnant males, plants that don't die. In a computer that could mean coming up with program code that hasn't existed or superior networking or even the futuristic predicament

depicted in *The Matrix*. Coevolution is defined as a “Reciprocal evolutionary change in interacting species” (Thompson 1984). It is a system open for input from either side, a system that provides an environment for mutual evolution based on exchange of information, a symbiotic relationship whether based on antagonism or cooperation is in itself a vivisystem spiralling forward.

“In the network era – that age which we have just entered – dense communication is creating artificial worlds ripe for emergent coevolution, spontaneous self-organization and win-win cooperation. In this Era, openness wins, central control is lost, and stability is a state of perpetual almost-falling ensured by constant error.” (Kelly 1994:116)

Linux is an operating system that is developed under the axiom of ‘open source’. Anyone can write software and extensions to the OS and distribute it freely. It is the very concept of parallel system without the hierarchy of a linear system that gives Linux and the Internet its power and consistent development. “Open Source is doing for mass innovation what the assembly line did for mass production. Get ready for the era when collaboration replaces corporation” (Goetz 2003) Looking at all the concepts I have discussed one can see factors being shared between different disciplines. Since all disciplines acknowledge the absoluteness and reductionist binary code as the basic building blocks of a structure, they all have a common language that encourages hybrids and therefore evolution. Humanity has automated evolution, promoted its second self to evolve independently. Biotechnology is already swimming in the shallow waters of artificial intelligence capable of reproducing and evolving into stronger breeds. The advantage that artificial evolution has over natural evolution is that of speeded up communication and networking. A DNA molecule cannot transmit its information to other DNA molecules and draw comparisons to attain an overall higher evolutionary state; the process takes thousands of years. A networked microprocessor, however, can do so instantaneously.

Kevin Kelly came up with the term hyperlife, which I will use in this paper, to describe

...a particular type of vivisystem endowed with integrity, robustness and cohesiveness – a strong vivisystem rather than a lax one. A rainforest and a periwinkle, an electronic network and a servomechanism, SimCity and New York City, all possess degrees of hyperlife.... A library that contains...anything bucking the

second law of thermodynamics, all future and all past arrangements of matter capable of an open-ended evolution.... (Kelly 1994:449)

Fiction literature and cinema has introduced many ideas into a human parallel network. When writing his book *Neuromancer* in 1984, William Gibson formed a space analogous to 'real' space where the characters transformed their surroundings and their image at will. Cyberspace, as he called it, was a conscious domain inhabited by all who choose to enter it, variable in its ramifications and transformable in its countenance. All you had to do was log in.

Cyberspace. A consensual hallucination experienced daily by billions of legitimate operators, in every nation, ... A graphic representation of data abstracted from the banks of every computer in the human system... The cyberspace matrix was actually a drastic simplification of the human sensorium, at least in terms of presentation. (Gibson 1984:51)

Although still unrealised in its fully sensual way online, cyberspace is the ecospace of the human mind. It is a library of knowledge, an archive of all human physical and mental activity. (Additionally, it is the means by which computers network with each other and create a hive mind of their own the outcome of which is still questionable and is the subject for another paper.). Another example of a parallel network that we take part in is to some an esoteric idea yet takes up a large part of our life.

People tap daily into the collective network to get in touch with other people, to connect with their Muse or to obtain information. A wide range of literature on astral projection reveals another layer of consciousness that often expresses itself when the physical body sleeps. This act expresses itself also in dreams. Some of their content points to the involvement of the dreamer in events occurring in different places. Contrary to the Freudian doctrine, this involvement explains many cases of déjà vu and familiarity with places and people even though they've never been visited or met. It is the subject of philosophers, yogis, shamans and some drug gurus. This collective network evolves constantly and runs simultaneously to the individual network. A hyperlife. Carl Jung spoke of such collective network. A collective sub-consciousness that feeds the conscious mind with occasional clues on its existence through dreams, synchronous events on an individual dimension and on a cultural dimension. A communication exists between people, events and

places whether conscious or not, this communication is a transfer of information, an immediate synchronous recognition of information. It is the operating means of the hive mind germinating from a multitude of individual nodes. What do millions of people do in internet cafes and in their homes all over the world constantly? They're logged on. They surf the web. One is physically situated in front of a computer screen stationary while dynamically navigating in an uncharted domain; one is 'there' yet nowhere really, yet there exists a 'there-ness' that indicates that one is somewhere. The concept of space is different from that of the material world as is the concept of time as one surfs through data and information, which is displayed dynamically yet demanding merely the twitch of a finger from the user.

In man's original view of the world, as we find it among the primitives, space and time have a very precarious existence. They become 'fixed' concepts only in the course of his mental development, thanks largely to the introduction of measurement. In themselves, space and time consist of nothing.

(Jung 1972:28)

What Jung was talking about in his time was an immaterial world. Half a century later, that world, though still immaterialised has had a portion of it woven into the ecology of the consciousness more than anything. It has been externalised by the net and internalised, in the least, by the knowledge and recognition that if something/someone exists they will be found on the net. Madam Blavatsky, a spiritualist and founder of the Theosophical Society in Germany, wrote in The Secret Doctrine in 1888:

Occultism teaches that no form can be given to anything, either by Nature or by man, whose ideal type does not already exist on the subjective plane; more than this, that no form or shape can possibly enter a man's consciousness, or evolve in his imagination, which does not exist in prototype, at least in approximation. (Blavatsky 1980:42)

Blavatzky talks of the fact that all things, which have form or shape, have an equivalent in the psyche that precedes its manifestation in form. Or when projected on the world of servers and computer and mobile network one can regard that network as the 'subjective plane' of which she talks about. Once the nanoprocessors of the future can network between themselves, they will be

able to evolve and it will be difficult to distinguish between what man put into the system and what the system created itself. The port of meaning through which we consider things to be internalised or externalised is in dynamic flux in itself, it evolves. Stockhausen often refers to music as a spiritual and enlightening experience created by humans as a tool to connect to a deeper and ubiquitous consciousness. He considers musicians to follow a guiding path to a higher state of being by playing. Jamming is considered by anyone who's experienced it, a spiritual experience. It is a point of communication between the musicians as individuals as well as between the musicians as a collective and a 'thereness', a collective pool of experiences. While jamming, time and space are forgotten and that feeling of absence can be conveyed to the audience which eventually become active participators. Jamming, of course, is not confined to a musical context but extends itself to other fields of collaborative expression.

We have seen that the basis of parallel systems or networked systems can be represented in a scientific model as well as a metaphysical one. Coevolution is a trait of adaptability of networked systems and the open-source trend, typical of the Gnostic spirit, a necessity to the successful survival of a behavioural model. The jam is one example of use of a networking idea between people to create music. In the next chapter we will see how the scientific and metaphysical thought models that I have touched upon find their way to other music composing techniques.

CHAPTER THREE: SOUND COMPOSING

Magic and Gnosis, as we discussed earlier, had its goal set to a spiritual transcendence through practice of code or formula. Albeit seemingly a rigid technique, the ways and codes used were to the discretion of the practitioner and generally open to changes and improvements from different areas of knowledge. That very openness, the admittance of a chaotic factor into the system, is the key to its survival as a successful technique. I will apply these ideas when discussing sound composing techniques in this chapter.

Electricity and electromagnetic waves have created a virtual world for us. Those forces have shifted the musical realm into a virtual world as well. Sounds never heard before yet sounding very intimate as they correspond with frequencies and pulses that our brain and our environment produce. The sounds made by the electrical currents and electromagnetic grids have been exteriorised by musicians. It is safe to say that of all of our senses, the one that dipped first into the virtual world created in this networked infomaniac age, is our sense of hearing which has had to develop a new way of listening and redefining music, sounds and atmosphere. Sound creates atmosphere, it is the first to break the boundary of cyberspace using 3D sound in home cinema, and software which allows sculpting sound waves like putty in just about any possible way. The composition of sound comes from a personal space yet common domain. One can transcend the body and day-to-day spiritual life through music. All different kinds of artistic evolution are invariably linked to each other as well as to cultural and technological development throughout history yet the one discipline that co-evolves with music tighter than others is literature.

With the introduction of hypertext, on its various forms from the first computer indexing languages of the late 50's through 'choose your own adventure' books and until today's interactive multimedia applications, the knowledge space that text referred to has expanded to a third dimension. Hypertext is the basis for a decentralized linked network of knowledge where the readers not only navigate according to their interest but in some cases can also add their own input to the script. It involves every individual who is exposed to it in some way and is an open ended, networked, perpetually propagating form of text that due to its biological-like interweaving, is an evolving system representing malleable realities, a hyperlife. Hypertext is the best result we

have of the tri-millennial quest for an underlining code that lines the fabric of our existence as a human collective.

As in the previous stage of literary evolution, this extends itself to all art forms. In music this expresses itself in several aspects: a) Soundtoys that are available on the Internet (www.soundtoys.net) or any other medium that involves interaction from the user to determine the sound (even radios, CD and DVD players). b) Software compositions and the use of genetic algorithms in musical instruments. c) A non-linear perception of sound which evolved from game culture that opens the door to an entire domain of artistic expression that is waiting to be explored. But more so, the fragmentation of knowledge and action to basic common particles introduces the possibilities of creating a collaborative multidisciplinary experience involving several intertwined art forms and the audience to create an artistic happening that is more reflexive. The medium the artist uses for expression has its own evolution and life and is a cross pollination of the artist and the audience. For example in a project that I worked on in 2004, the user navigates with a joystick through a surround sound space. The audio content is like hypertext, strewn with links to other sounds, which in turn link up to other sounds, all to the discretion of the user. A narrative is created anew each time.

Another kind of composing method that follows the models of reality presented by the researchers mentioned in the previous chapter is Generative Music and Algorithmic Music. Generative music is a music that produces itself by applying an open-ended algorithm to sound sources unfolding an unrepeatable composition. Musicians such as Kit Clayton or Autechre create software that is used to generate music that is 'theirs' allowing a degree of interaction from the listener. The composer/musician relationship has evolved to software designer/sound designer. In other words, the musical tools co-evolve with the music. With a prophetic answer in a 1995 interview Brian Eno sums it up well:

What people are going to be selling more of in the future is not pieces of music, but systems by which people can customize listening experiences for themselves. Change some of the parameters and see what you get. So, in that sense, musicians would be offering unfinished pieces of music - pieces of raw material, but highly evolved raw material, that has a strong flavour to it already. I can also feel something evolving on the cusp between "music," "game," and "demonstration" - I imagine a

musical experience equivalent to watching John Conway's computer game of Life or playing SimEarth, for example, in which you are at once thrilled by the patterns and the knowledge of how they are made and the metaphorical resonances of such a system. Such an experience falls in a nice new place - between art and science and playing. This is where I expect artists to be working more and more in the future.

(Kelly 1995)

Eduardo Reck Miranda, a researcher, composer and teacher of computer music techniques at the Plymouth University, claims to have composed the first electroacoustic musical piece using a parallel computer. 'Olivine Trees' (1995) was made from sounds using ChaosSynth, a granular synthesis system he devised that ran on a parallel connection machine. The ChaosSynth is based on Cellular Automata. The **Cellular Automata** was introduced in the Sixties by Von Neumann and Ulan as a model for biological self-reproduction. A grid or matrix of cells would evolve by answering to a set of rules determined by its creators. It would scan the existing cells and determine the next row of cells. This simple procedure has been applied to many purposes as well as to music, as a method of composing. Other musical systems use evolutionary algorithms to create music. Miranda's research extends to creating music by extracting genetic algorithms based on biological data and by simulating emergence of musical forms in a virtual community. The hypothesis that he tries to prove is "...*that one could improve computer composition systems considerably by including mechanisms that take into account the dynamics of cultural evolution and social interaction...*" (Miranda 2003).

After listening to music composed using generative and genetic algorithms and various softwares such as ixi, ChaosSynth, CAMUS and the likes. I have found the music to sound rather dull. All the instruments I have checked were creating MIDI notes to trigger outboard MIDI devices. Unless the devices are samplers then the musical output, rather than engaging the listener, provides a sort of background noise like traffic or a feng shui fountain, which could be quite soothing and enjoyable yet not very interesting in a musically creative way. By using samplers as the playback devices, the composer inserts control over a certain narrative element that is being picked, which despite of the nature of the chosen algorithms still sound random; yet allows the listener to create their own narrative. While trying to imitate nature's operational algorithms, the composers have left out the listening audience out of the equation. The narrative has been left out. The act of composing often fuses natural algorithms hardwired into human thought

processes with an individual sauce that gives the music its particular flavour, tasteful to some and tasteless to others. While Miranda looks for mathematical algorithms to represent cultural evolution and social interaction to incorporate into musical instruments, Kylie Minogue performs quintessential compositions swirled from the core of Western culture. Pop, at its crystal-clear-production best, is the musical peak of the safe majority. Good pop takes all successful musical elements synthesised from decades of folk based music and washes them with a contemporary coat of paint that sparkles. It contains elements that are so ingrained in human thought as an individual and as a culture that it sticks to mind, regardless of the fact that big record companies pay lots of money to have it played to death on the radio.

As the tools to create music become more pliable and responsive to biological behaviour models so does contemporary music adopts sound patterns and timbres that digitally reflect the chaos and order ratio of nature. London at the moment is abundant with noise bands and noisicians play music festivals. The music combines sounds that flow into each other and are at times so fluid and expansively varied that they have a very organic and visceral feel to them. They sound like that because they have the right balance of order and chaos in them that reflects nature and the behavioural patterns explored in the previous chapter. Timbre-wise they are an amalgamation of a vast spectrum of familiar and unfamiliar sounds sequenced in a very intuitive and sometimes sporadic way rather than falling to a strict structure. The order is conveyed sometimes by a layer of rhythm also composed often from a variety of well-processed sounds.

Music, as we have seen in this chapter, is extremely reflexive to technological development and is moving from dogmatic composing models to composing methods that follow, probably unintentionally, biological behavioural models

CHAPTER FOUR: INTERACTIVITY

As we have seen, once a networked system is formed, coevolution is a necessity in order to sustain the system successfully. Since, program code is tapping into the malleability that is so characteristic of the flux of life; technology is readily available and increasingly user friendly; Software and hardware for different purposes are designed to work together through common interfaces; and artistic communities and disciplines worldwide have common platforms on which they can meet, interact and collaborate; The contemporary artist uses different disciplines and forms of expression to make their art, as well as being inspired by the abundance of new environments, concepts and paradigms created by computers. Whereas in previous decades the professions and skills were more isolated and fragmented; now we see stronger bonds between different disciplines. In the last 25 years computer games have been the forerunners of computer audiovisual interaction, they show audio and visual contents interlinked in a more evoking way than in cinema because it is the users action that triggers the sound/image. Multi-touch computers are on the brink of entering the market and changing computer interface as we know it forever. Sensor and software technology create a feasible line of immediate effect between movement, sound, vision, light, heat, condensation, consistency and so on, and this gives new concepts for a plethora of art projects. The artist role is transposed to that of a creator of experience in the broadest sense a sort of god using any element in the real world to be in dialogue with any element of the virtual world and vice versa. This can extend itself beyond limitations of space and time through the medium of the Internet. This freedom permits the artist to explore any interaction using anything at all as the artistic tool.

It also means that the wide distribution of these softwares and hardwares has some side effects apparent in the musical and artistic content (or lack thereof) and is inevitably part of the trials that technology and art go through to evolve. The music or art is at times simply the modus operandi of the technological tools used to make it. It is the light the bulb gives when we switch it on; the means decide the result rather than having a creative idea and using the tools to achieve that idea. There are few musicians and artists who actually add a spark of personal ingenuity and depth of thought to the process.

We are rapidly catching up with Sci-Fi, which can sometimes be confused with news articles. This might explain why *Star Trek* has been reincarnated several times and is now just a soap opera with odd-looking characters. Perhaps this accounts for society's increasing realistic taste in arts. The popularity of reality TV, hand-held camera movements, realistic Polaroid-style photographs in galleries, webcam streaming, all pointing to the viewer's yearning for participation, for immediacy.

"In all these cases, the logic of immediacy dictates that the medium itself should disappear and leave us in the presence of the thing represented..." (Bolter & Grusin 2000:5). The urge for immediacy is emblematic in alchemical and Gnostic thought. The need to represent reality as it is as opposed to myth generating religion, to surrealism and abstract art which put reality through subjective, conceptual and symbolic filters. While every representation of reality uses a filter and is a misrepresentation, the trend towards transparency of the subjective filter, towards a re-experience, towards parallel participation in events dislocated from a linear space and time perception is what motivates this relentless dilution of the medium.

The need for immediacy naturally expresses itself in the multitudes of mobile phone users.

On the one hand, you have the supremely individualistic view, you might almost call it atomistic. There is no real gathering at all. Instead, there are only isolated individuals... On the other hand, there is a system of messages, and at that level there are no human agents at all, because they are overwhelmed by the sheer exuberance of the messages as they multiply and reproduce with a life all of their own. Instead of a group, there is on one level just the individual, and on another level just the pure system, servicing itself as effectively as possible.

(Myerson 2001:38)

Myerson points out the mesh, created by using text messages as the link between the individual nodes, being a swarm or a hyperlife with individuality in its own right

A metaphysical-physical circle has been closed when witnessing that human behaviour and thinking of the aforementioned theory by Jung. A chunk of the information being communicated in the collective subconscious has bled into public cognition. This new cognitive environment has its own ecosystem of nodes; messages; independent fluxes such as bots, spywares, viruses,

worms, Trojan horses; and sounds. Like all ecosystem, it is an open ended parallel network and is interesting to use as a model to study the subconscious dynamics flowing in a society.

The Internet being an enormous archive is in itself a subject of art projects inviting artists to explore and analyse this massive human brain on its inhibitions, oddities and associations. Net-Art becomes a convergence of the different elements that compose an experience, with the obvious limitation of the user having to sit in front of a computer screen. However, sensor and wireless technology are on the fast track to changing that too. Wi-Fi Hotspots are and can be set up almost anywhere urban. They are loosening the barriers between cyberspace and realspace. In the words of the creators of Noderunner, a prize-winning game at the 2003 Prix Ars Electronica Cyberarts Festival: “... *we now have the ability to turn... a city's infrastructure into a play space. Our cities are becoming game engines and software, as citizens collectively program, code and update the place where they live.*” (2003 Prix Ars Electronica Cyberarts Festival Catalogue) In the same festival, Blast Theory's project uses GPS trackers to relay the physical coordinates of the players to virtual spaces and incorporate them in a networked game. But it is not only the barrier between physical and virtual space that is being challenged by Net-Artists, it is also the barrier between different network processes and computer instructions that's being explored in what can be also known as software art. Once the actual circuits of a computer are demystified and re-engineered to create computing systems with alternate results, the potential for artistic exploration becomes very vast. The Net/computer artist has to be a programmer or of technical know-how in the same way a craftsman knows his tools or at least be lucky enough to work closely with someone who is. We can only expect computer hardware to increase in complexity and potential for linking up with other types of hardware.

I have just skimmed the surface of the subject of interactive art, but I have shown that it is a realisation of the Gnostic dream, albeit dissimilar to the enlightening spiritual experience the Gnostics strived for. The fusion of program code with the creation of experience recalls the quote from the *Corpus Hermeticum* I gave in the first chapter. All elements of the network system apply to the Internet. In order to exploit this potential, the interactive artist picks up the role of the alchemist by finding the correct code with an optional intention to create a spiritual experience. The artists, who use interdisciplinary mediums, more than ever before, are sorcerers, weaving fantastical or pseudorealistic experience out of their will and with a code. The disciplines they use are nodes in a mesh; by connecting them they establish groups of correlation, a structure. There

are infinite amount of structures and correlations. This mesh is a hyperlife and a parallel system that involves both 'real' and virtual worlds and therefore a kind of offline cyberspace striving ceaselessly towards a point of Singularity.

CONCLUSION

Since technological applications are unquestionably man-made as is cyberspace, by interacting with them we rediscover the magical part of ourselves. It is not the gods' mysterious ways or tribal myths or the unpredictable force of nature, this magical reality originated from craft. Although one could argue that tribal myths and the myth of a god as an omnipresence originates from the craft of imagination, now science is a foundation on which the magical self develops. The intention in mimicking nature's 'code' in music and arts is to crystallise a ubiquitous formula that traverses all organisms and originates from man's continuous effort to achieve purity. Essentially it is a Gnostic idea,

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The concept of Cyberspace is manifesting itself both offline and online, for it is the spirit of interconnectivity within the human sensorium projected on the canvas of the tech-art world. Art has always been about transcendence from a spectator to participator in a galaxy created by the artist. An immersion in an environment that has been fabricated by the artist channelled from a universally common domain that captures the attention of the audience. In this light, artistic progress is coevolving with scientific progress on the road to Singularity. The malleability of interaction between real and virtual worlds is realised most creatively by the artist. I am especially interested in the dialogue between these two worlds. Sound can be used as a binding force of the narrative of a multidisciplinary experience.

Some interactive art evolved to an experience shared by both the artist and the audience and the artist is only the significant in this case because it is he/she who presents the project to the world and ties the nodes together. We are only in the dawn of this age of interactivity, of 'artificial' experience generation. Through a definition of each individual's part in the mesh of cognitive interactivity we create a new level, a parallel system from which new structures of experience can grow.

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