Ephemeron:
Control over Self-Organised Music

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Abstract — **The present paper discusses an alternative approach to electroacoustic composition based on principles of the interdisciplinary scientific field of Systemics. In this approach, the setting of the electronic device is prepared in such a way to be able to organise its own function, according to the conditions of the sonic environment. We discuss the approaches of Xenakis and of Di Scipio in relation to Systemics, demonstrating the applications in their compositional models. In my critique on Di Scipio's approach, I argue that the composer is giving away a major part of his control over the work and therefore the notion of macro-structural form is abandoned. Based on my work *Ephemeron*, I show that it is possible to conduct emerging situations applying the systemic principle of 'equifinality'. Moreover, I argue that it is possible to acquire control over these situations and their properties over time so as to develop formal structure.**

PREFACE

I do not believe that any treatise of music aesthetics, using the rhetorical skills in the domain of language, and supported by suitable logical arguments, can suggest an absolute manner of creation and of perception or that it can promise to be more effective than others. Nevertheless, a music treatise can demonstrate the framework in which a work has come into existence and in which it can be appreciated in a clearer fashion. It can help in the work's appreciation both in the logical domain and in the purely musical domain. In respect to that, my conviction is that a study including criticism on other approaches, serves only to show the similarities and the differences between the composer's aesthetical and methodological position is willing to propose and that of other aesthetical positions. Thus, I see no interest in a polemic treatise of aesthetics other than the pleasure of polemics itself. In this sense, the current paper that includes criticism mainly on the conceptual positions of other composers, serves to connect and distinguish the approach in my work *Ephemeron* in connection to theirs.

I.INTRODUCTION

The paper discusses an alternative approach to electroacoustic composition based on principles of the interdisciplinary scientific field of Systemics. In this approach, the setting of the electronic device is prepared in such a way to be able to organise its own function, according to the conditions of the sonic environment. In this way, the music result has a unique character in each performance.

The discussion, placed in the context of Systemics, starts with an introduction of some fundamental systemic concepts. By referring to Xenakis' 'Markovian Stochastic Music', I present one of the first attempts to apply in music concepts deriving from the theory of Cybernetics. Di Scipio critique on Xenakis is examined, as it is one of the fundamental factors for the conception of his own musical application of Systemics. Di Scipio's model of 'Audible Ecosystemics' is demonstrate, in which the central role has the concept of a self-organised system. In my critique on Di Scipio's approach, I argue that the composer is giving away a major part of his control over the work by choosing to opperate only on the basic organisational level. In this sense, even though the composer controls the communication between the system and its environment, he loses control over the final result. Consequently, the notion of macro-structural form is abandoned. Moreover, I attempt to define 'self-organized music' and to establish a general model in the context of electroacoustic music. For this, I am using Di Scipio's model, interpreting it through the model of Second-Order Cybernetics.

The last section is devoted on the presentation of my compositional approach using systemic principles, through my work *Ephemeron*. I demonstrate the structure of the model based on the concept of an 'adaptive living organism' and its first complete application in the concert hall of ZKM. Through that, I show that it is possible to conduct emerging situations, applying the systemic principle of 'equifinality'. Moreover, I claim that it is possible to acquire control over these situations and their properties over time so as to develop formal structure.

II.SYSTEMICS AND MUSIC

My research is focused into Systemics for a period of more than three years. First, the interest started from a philosophical viewpoint, fascinated from the idea that everything can be considered and be observed as an organisation. Then, I focused in applying the model and its concepts into music.

As I have shown in previous studies [1] [2], Systemics can be applied in all musical creation. However, here I will limit the discussion only in self-organised electroacoustic music and mainly in connection with Xenakis' approach and more particular with that of Di Scipio.

A. Introduction to some systemic concepts[1]

Before starting the discussion around self-organised music, I will suggest some concepts of the original field of Systemics. First of all, Systemics is consisted of a number of interconnected interdisciplinary theories, mainly Cybernetics, General Systems Theory and the more recent Complexity Science. The main framework of Systemics is the treatment of organised entities. In this viewpoint, everything can be considering as a system.

In its abstract sense, as Bertalanffy explains, '*a system is a whole consisted of interacting parts'* [3]. From the perspective of *system differentiation theory*, as Luhmann explains, the division between *whole and parts* becomes *system and environment* [4]. In this sense, a part of a system can be considered also as a system itself within its environment. It is also implied that the system in question can be itself part of a more complex system.

Systems can be closed or open. According to Bertalanffy, closed are the systems '*which are considered to be isolated from their environment'* [3]. These are systems treated by conventional physics as for example chemical reactions in a closed vessel. As Luhmann puts it, closed systems are only a 'limit case' [4]. Bertalanffy states that all living organisms are open systems [3]. He defines an open system as *'[…]a system in exchange of matter with its environment, presenting import and export, building-up and breaking-down of its material components'*.

In a closed system, the initial conditions determine a particular final state. Consequently, a change of the initial conditions results to a different final state. However, this is not the case in open systems. The notion of *equifinality* describes the property of open systems to achieve the same finals state upon different initial conditions [3]. An example in biology is the property of organisms of the same species to reach a specific final size even though they start from different sizes and going through different growth's courses.

B. Xenakis, Cybernetics and his Markovian Stochastic mechanism

It is well-known Xenakis' relation of music and mathematics. He is the first one that introduced systematically the notion of probability in music [5]. Even so, what is not so obvious is his connection of music with Systemics. In a lettre to Hermann Scherchen, in 1957, Xenakis writes: *'[…] j'ai trouvé que des transformations qui sont à la base de la cybernétique, je les ai déjà pensées et utilisées dans les Metastaseis, sans savoir alors que je faisais de la cybernétique!'* [6].[2]

In the description of his 'Markovian Stochastic Music', Xenakis explains the theory behind *Analogique A* (1958-59), for strings and *Analogique B* (1958-59), for tape [7]. He is using step-by-step the method of Ashby found in *An Introduction to Cybernetics* [8]. In particular, Xenakis shows the sonic transformations with matrixes, and as Ashby, Xenakis starts with determinate transformations continuing with stochastic transformations.

In his basic hypothesis, Xenakis claims that *'[a]ll sound is an integration of grains, of elementary sonic particles, of sonic quanta'* [7]. According to this hypothesis, it is possible to analyse and reconstruct any existing sound or even create non pre-existing sounds as a combination of thousands of grains. His so-called granular hypothesis is connected with the production of timbres, where *second order sonorities* emerge from clouds of sonic grains. As Di Scipio points out, it is possible to describe second order sonorities as a question of emerging properties of sound structures. According to Bregman:

> '*Sometimes, in the study of perception, we speak about emergent features. These are global features that arise at a higher level when information at a lower level is grouped. […] Because nature allows structures to behave in ways that are derived from properties of parts but are unique to the larger structure, perception must calculate the properties of structures, taken as wholes, in order to provide us with valuable information about them.'* [9]

Concerning *Analogique B*, even if it may not be considered a particularly successful application of the theory, it is very significant since it is regarded as the first work of granular sound synthesis [10]. In the basis of Xenakis' application of his hypothesis, as he describes, there is a mechanism, *'the "analogue" of a stochastic process'* [7]. Xenakis explains the compositional process within his model: '*At first we argue positively by proposing and offering as evidence the existence itself; and then we confirm it negatively by opposing it with perturbatory states'* [7]. More precisely, the composer on the on hand is causing perturbations to the mechanism, while on the other hand he lets the mechanism approach the state of equilibrium. This dialectical process lets the mechanism manifest itself.

C. Di Scipio's critique on Xenakis

Di Scipio claims that the stochastic laws, which Xenakis is using to apply his hypothesis, are not capable of determining the emergence of second order sonorities [10]. He explains: '*Just as the pizzicatos of Analogique A could not but remain string pizzicatos, however dense their articulation, the electronic grains in Analogique B remain just grains and do not build up into more global auditory image.'*

Summarizing the conclusions of Di Scipio, Xenakis' mechanism: 1) is sensitive only to initial conditions, 2) its process is oriented towards a goal 3) the goal changes upon different initial conditions [10]. I have to add here that all of the above clearly show the characteristics of a 'closed system'.

In addition to the three above conclusions on the mechanism, Di Scipio also claims that in Xenakis'

[1] For a more detailed presentation of Systemics see the second chapter of [1].

[2] '[…] I think that the *transformations* which are on the basis of cybernetics, I have already though and used them in *Metastaseis* without knowing that I was doing cybernetics!'.

model: 1) timbre and form are the result of *'one and the same creative gesture'* 2) The hypothesis of second order sonorities can be successfully applied within a self-organised system's model [10]. The first point is actually an interpretation of the model that has been proven very fruitful in Di Scipio's music. However, as the application of the theory suggests, it is not an intrinsic aspect of the theory. Nevertheless, Di Scipio is using this interpretation as a fact in order to conclude that Xenakis' mechanism *'tends to establish itself a self-organising system'* [10].

D. Di Scipio's Audible Ecosystemics

Although I believe that Di Scipio's two conclusions, stated above are personal interpretations of Xenakis' model, in his personal approach they are proved particularly effective. In his model, what he calls *Audible Eco-Systemic Interface,* Di Scipio is placing the mechanism of Xenakis in an 'updated' systemic context. Here, the 'closed system' is replaced by an 'open system', a 'self-organised system'. In addition, unlike Xenakis' mechanism, all operations producing the sound result are taking place during the performance. Consequently, at the same time with an alternative approach to that of Xenakis, Di Scipio is also proposing a new interpretation of live interactive composition.

The basic concept is that the composer creates a DSP capable of self-organisation, a kind of music *organism* able to 'adapt' in a given concert's space, the organism's *environment*. The sound result depends solely on the organism's interactions with his environment, as *there is no pre-recorded material used at any point during the performance*. This adaptation is the result of the *organism's properties* causing changes to the organism's processes as a consequence of its constant communication with the given *space's properties*.

Finally, in Di Scipio's approach, the creation of sound material and of musical design are parts of one and only process [12]. As he describes, the composer lets '*global morphological properties of musical structure emerge from the local conditions in the sonic matter*' [12]. With his proposition for a *Theory of Sonological Emergence*, form becomes the formation of timbre.

E. Critique on Di Scipio

In Di Scipio's approach, the composer's focus of control is deliberately put in one and only temporal level of organisation, which is the basic micro-temporal level, letting the higher levels in favour of any occasional system's spatiotemporal dynamics. In any organisation, the control of the basic elements' formation including their interactions *does not necessarily signify the control of the formation of the whole system*. Even if there is a controlling process over the design of a system's level, that is to say the elements, their properties and their interactions, *the emerging properties of the higher organisational levels are irrelevant from this controlling process.*

Di Scipio, in favour of his persistence to *microstructural sonic design*, is giving away control of the different temporal levels' formation. Consequently, the composer is losing control over the final result while notion of formal structure is abandoned. I do not find any other reason for this persistence other than to attain continuity among the different temporal levels of organisation, since each level above is formed solely from the interactions of the level below it. Clearly, Di Scipio's approach is exclusively a *bottom-up organisation.* Nevertheless, as Mitchel explains, all adaptive systems preserve balance between bottom-up and top-down processes with an optimal balance shifting over time [13]. Di Scipio's model may be a self-organised system but its organisation lucks the multi-level processing of adaptive systems.

As a general principle of Di Scipio, the system's evolution in time is the result of its interactions in an elementary level. Nevertheless, there are certain cases in which a regulative process can be triggered and change the system's behaviour. For instance, in some works he is using a process that counts constantly the sound's activity in space. If it perceives that there is not enough activity, a set of microphones positioned in a different space are opened, feeding the ecosystem [14]. In this case, even if he designs the interactions of a higher level and he is giving again the control to the system itself, *the process causing the change of behaviour to the mechanism is not emerging from the basic elements of the system*. It is an automation that, to put it in his own words, *'is forcing the system to change from the external'* [10].[3] Notably, even if this process occurs rarely, it contradicts his theory of *microstructural design* since this process establishes differentiation in a higher organisational level and this there is an implication of *macro-structural form.* Even though, the however sporadic sequence of behavioural changes, it is not predetermined but is in question of the occasional ecosystem's dynamics.

Another conceptual contradiction is the influence of the performer over the result. In principle, the role of the performer is deliberately diminished, while it is the dialog between the system and the occasional space of the performance that creates the music. Nonetheless, in some cases, the performer makes changes to the input of the machine, which can clearly be considered as an interaction. For example, in the second work of his series *Audible Ecosystemics*, *Feedback Study* (2003), three *'gesture morphologies'* are proposed to the performer *'[a]s a general guideline'* [15] (Fig. 1).

F. Self-Organised Electroacoustic Music

With the term *self-organised music,* I refer to *the result of the interactions between some predefined structures and an occasional context of performance, through a particular interpretational model.*

Since here, our discussion is within the context of electroacoustic music, the 'predefined structures' are a particular setting of the DSP, while the 'interpretational model' is the definition of real time control parameters, what Di Scipio refers to as Control Signal Processing (CSP).

[3] Reference to Di Scipio's criticism on Xenakis' stochastic mechanism.

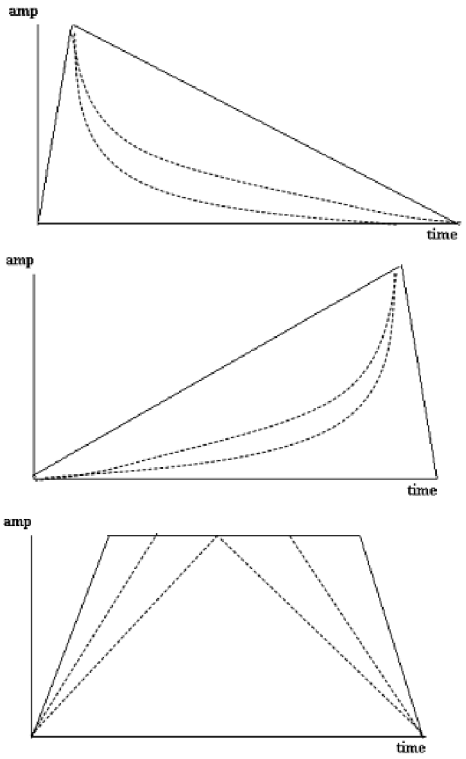

Fig. 1. The three 'gesture morphologies' over the input as guidelines to the performer of Feedback Study [15].

Based on Di Scipio's self-organised system, combined with the model of Second-Order Cybernetics, I have attempted to create a general model of self-organised electroacoustic music (Fig. 2):
The system's goal is to *control* a number of preferable variables, which represent specific sonic features. At the same time, the *perturbations* on the system are any unforeseen sounds that destabilize the system's preferable variables, in other terms *noise*. The system *observes* auditorily its environment, which is the sonic space of the performance. The process of *perception* is possible through the microphones (the sensory organs) representing the sound digitally. The representation of sound is treated in two different lines: the DSP and the CSP. Within the CSP setting, combinations of values, representing specific sonic features, influence the values of the DSP through a mapping function, which can be linear or non-linear. In this way, the DSP's characteristics are regulated from the CSP, at the same time with the DSP's processing. The result of the system's process *acts* sonically on the performance space, translated into sound through the speakers. This sonic action has an impact on the 'dynamics' of sound in space. Moreover, the *perturbations* of the environment influence sound's dynamics and indirectly destabilize the system. Finally, the circle restarts with the whole sound result in the performance space that again is perceived from the system.

III.EPHEMERON: EQUIFINALITY AND CONTROL IN SELF-ORGANISED MUSIC

I will now present my work *Ephemeron* a direct result of the research on the field of Systemics and its applications to music. Through that, I will show that it is possible to conduct emerging situations applying the systemic principle of 'equifinality'. Moreover, I will demonstrate that it is possible to acquire control over these situations and their properties in order to use formal structure over time.

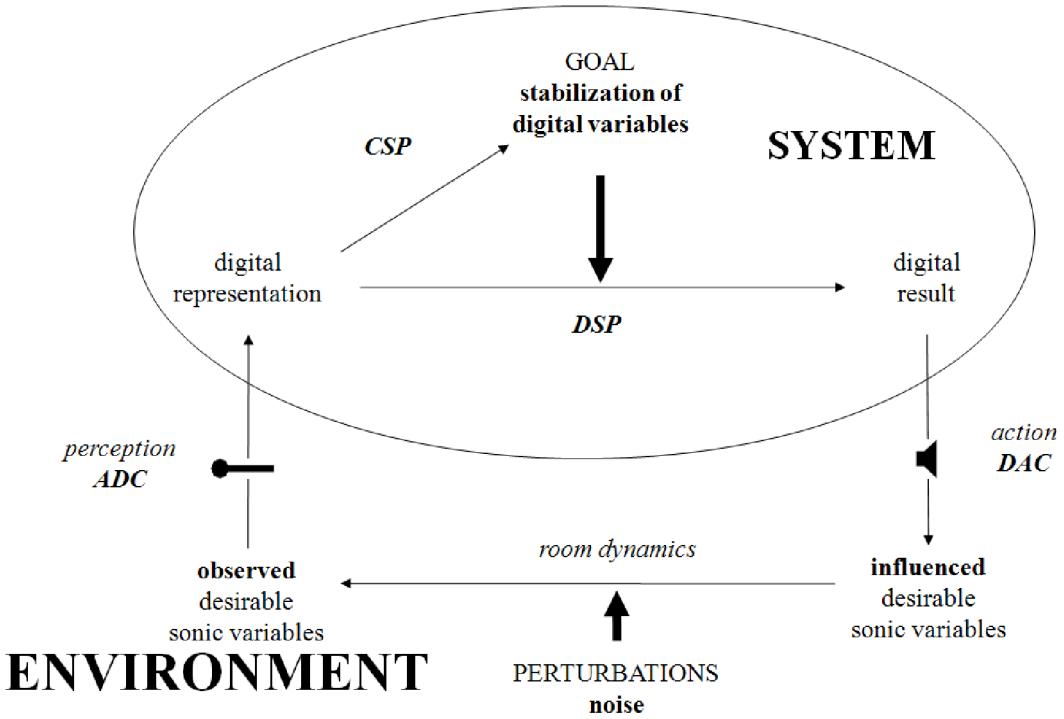

Fig. 2. A general model of self-organised electroacoustic music
(interpretation of the written and schematic description of the model of second-order cybernetics found in [16])

A. *Ephemeron: The Work*

Ephemeron was commissioned by Pedro Bittencourt and it was mostly developed in the Kubus concert hall of ZKM where it was also premiered. The program note provided *after* the concert was the following:

> *Microphones wide open were listening to you, listening to all of you. A newborn and constantly changing organism, existing in its unique space, was fed from every single action, every little sound of yours. Sound was flowing from the speakers manifesting the organism's existence into the concert hall. You were a unique unit of the audience with your unique perception. The audience, one entity, was fed from the organism's sounds, listening through your ears, listening through everyone's ears.*
>
> *The audience now is spread.*
>
> *The organism is no more here.*

The program note shows from the auditor's point of view the concept of the work. The work's ephemeral character is stretched and the systemic framework is implied.

A characteristic of *Ephemeron's* performance is that the sound material feeding the organism, at least at the beginning, is exclusively the applause of the audience which responds to the previous work. The organism reflects the audience's own action back to it, creating a work of music out of it.

I will describe the organism's main structure avoiding the confusing classification among global system, sub-systems and so on. For that, I will be based on the metaphor of a live organism, using biological terminology. This terminology is also coherent in the context of Systemics, giving a clear hierarchical structure.

First, an important clarification has to be made between the *'genetic' structure* of the organism and the *manifestation* of it. Staying loyal to the metaphor, we will use the distinction between the *genotype* defined as *'the sum total of the genetic information at all loci in an individual organism'* and the *phenotype*, the *'observable physical or behavioural properties of an organism that are produced by the interaction of genotype and environment during growth and development'* [17]. Here, the 'genotype' is the electronic algorithm along with the speakers and microphones. On the other hand, the organism's 'phenotype' is the sonic manifestation in a particular spatiotemporal situation. The organism's 'environment', in which the 'phenotype' results, is the actual space with its particular acoustic features, including any sound coming from the audience or from any other source.

The structure of the genotype is built in terms of control over the occasional manifestation of the organism in time but also in space. The organism's genotype has three major parts, which we will call *organs*. Each organ is consisted of four *tissues*. Finally, a tissue is formed from two *cells*, which are the basic organisational element of the phenotype.

This hierarchical structure is based on degrees of control (Fig. 3*)*. In the highest organisational level, the performer or the organism itself can influence parameters that affect all system's parts. This global parameters control the different organs, controlling the tissues, which finally control the cells.

Apart from the organism's structure in terms of control, the organism setting in space has also a specific structure according to the spatial distribution of its 'sensory organs' (the inputs, i.e. the microphones) and its outputs (the speakers). Each cell is manifested from only one speaker and it is fed from only one microphone. A

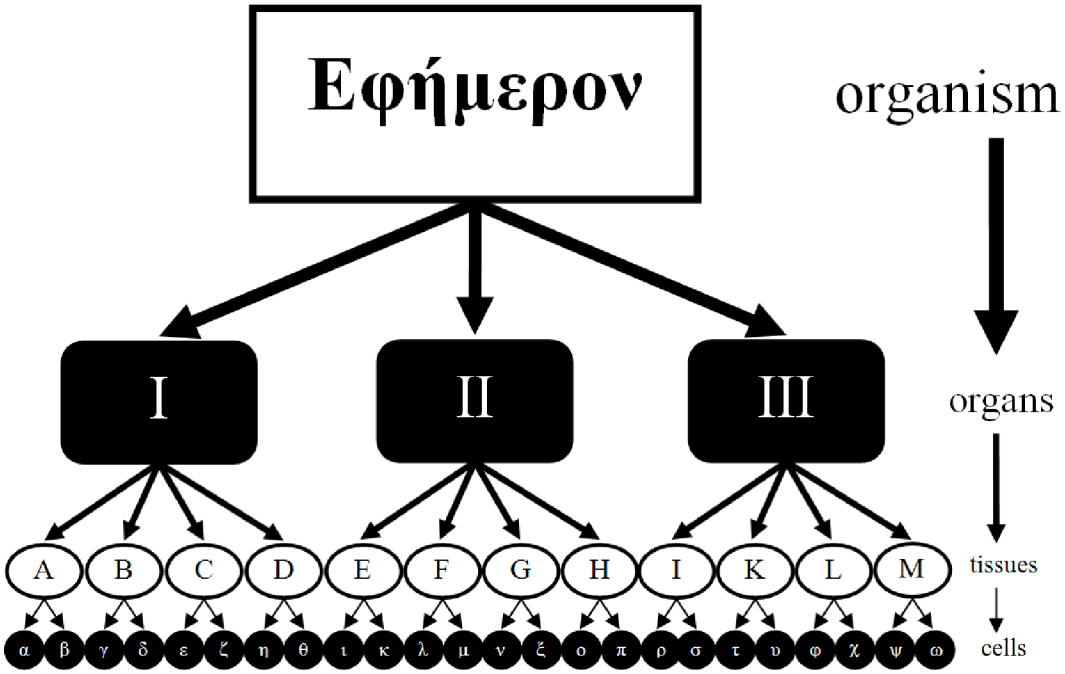

Fig. 3. The structure of the organism in terms of control's distribution.
Greek letters stands for cells, Latin letters for tissues and Latin numerals for organs.

speaker may project more than one cell. Each tissue has a unique combination of inputs and outputs.

Before the manifestation of the mechanism, between his birth and his death, its genotype has also to be adapted to the particular properties of the concert space. So far, four different 'adaptations' of *Ephemeron* have been existed in four different concert spaces. The first adaptation of *Ephemeron's* genotype was made in Z.K.M.'s Kubus, a forty-two speaker concert hall. Twelve speakers of the lower level, eight speakers of the highest level and four omnidirectional microphones were used. As it is shown in Fig. 4, the three organs were distributed in space using the front, right and left sides of the hall. The main field of the organism's spatial structure was arranged in the lower level of speakers. Furthermore, a secondary field was designed using the higher speaker's level. Except the differentiation in terms of high and low, between the two fields of manifestation, there was a difference in density of spatial projection. The higher structure was a 'folded' manifestation while the lower was an 'unfolded' one. The organism's parts could 'glissade' independently between the two fields (Fig. 5).

Regarding the existence of the music organism, I find useful the metaphor of a plant. Although the seed is not the plant itself, it contains an infinite number of possible existences of the plant. The existence of the plant may begin after a seed has entered in the appropriate environment (a fertile soil, an appropriate climate etc.) which can provide it with the appropriate amounts of energy (temperature, water, food etc.). Only then, the seed can start manifesting the existence of a plant. The plant's growth will pass through a series of states common to his species (principle of equifinality). Yet, it will show unique variation in the formation of his material structure, deriving from the interactions between its genotype and the environmental factors.

Accordingly, the music organism is something born within particular circumstances. The 'electronic' genotype includes infinite number of possible *Ephemera*. Its existence is interrelated with the beginning and the end of sound's appearance. More particularly, the organism starts to exist moments after energy is provided, by 'consuming' it. It stops existing after no more energy is left to consume and there is no more to be provided. In systemic context, the system manifests itself after the input's opening and dies after the input's closure.

In the basis of *Ephemeron*, each cell perceives and interprets the sonic reality of its environment. The cells are using dynamic control signal processing to interpret the perceptible loudness. This way there is constant change in the interpretation of the sonic reality it expresses. The basic function of the cell is to postpone the input information in a dynamic fashion while the time rate of the result's postponement is dynamically controlled from the system itself.

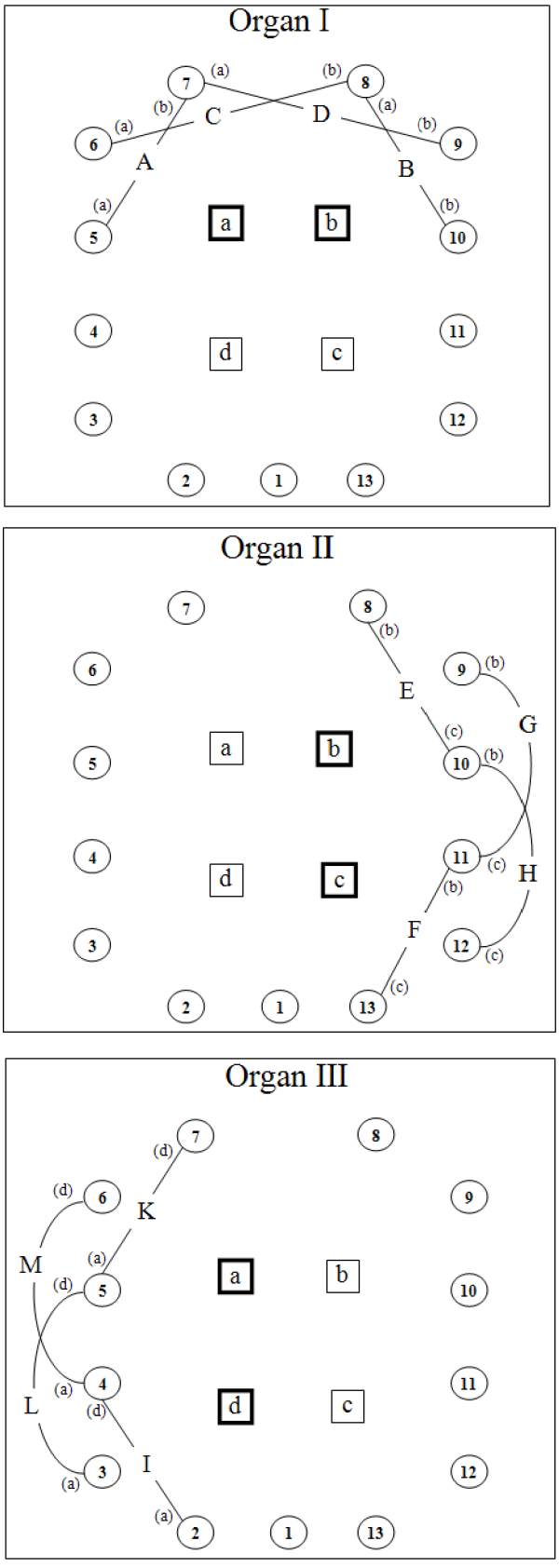

Fig. 4. The structure of the organs in terms of space. Arabic numbers stands for speakers, Latin numbers for tissues, boxed letters for microphones and letters under parentheses for the use of particular microphones within each cell

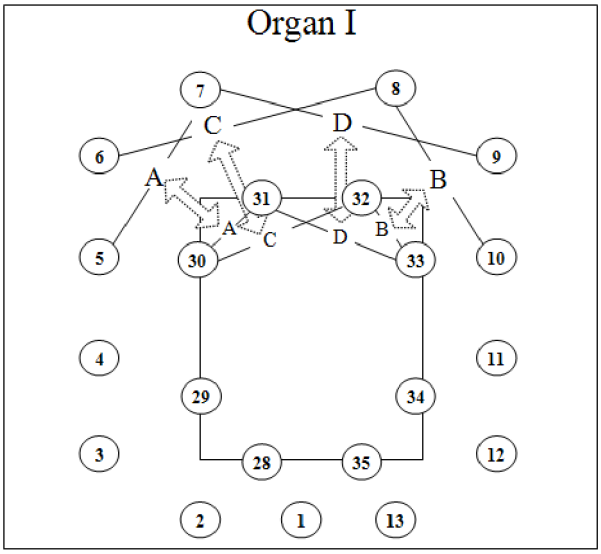

Fig. 5. The transitions of organ's manifestation between the two fields

The combination of all the cells' sonic expressions of their interpretation, make emerge something very different and much more complex that a mere reflection of the room's sonic reality. The emerging organism made by this sonic matter, it is a unique spatiotemporal expression. Spatial, since it derives from the setting of the genotype in space, and temporal, as the emergence of all ecosystemic interactions in a dynamic fashion.

B. *Equifinality – Control over self-organised electronic music*

My main hypothesis is that, if we consider the music organism as an open system, *it is possible to create certain conditions in which the organism will show tendency for 'equifinal' behavioural states.* As I explained before regarding 'equifinality', in an open system, '*the same final state can be reached from different initial conditions and after disturbances of the process'* [3]. I believe that *we can influence the system in order to pass from a series of behavioural states, which can be similar in any constitution of the same organism under similar circumstances.*

Consequently, in this context we are able to control the system in a basic level, by designing its elementary structures, and at the same time to acquire control over a higher organisational level, that of macrostructural form, without interrupting his ability of self-organisation. In other terms, we can let the system constitute itself, showing emerging properties over the different organisational levels and by indirectly influencing these properties we can acquire a desirable result of distinctive character. In this approach, *the composer is designing in a microstructural level and at the same time, through the role of the performer, he is controlling the sound result from a higher organisational level.*

In *Ephemeron* we have applied, I believe successfully, the above hypothesis achieving to create a 'live' organism with a specific formal constitution in time. During the concert, the organism is striving to adopt in the environment while the performer is directly changing some global parameters of the system and this way he is obstructing the system's tendency towards a state of stability. This way he is changing the organism's *behaviour*. The organism reacts by changing towards another stable state. Moreover, in each behavioural change, the information that the system perceives from its input, are interpreted in a different fashion and result to a different set of actions. The composer causes a series of changes in the behaviour of the organism.

More precisely, the performer during the concert 'interprets' a series of twenty predefined actions, causing the same number of behavioural states. His role is to 1) *change* the global parameters of the organism's structure causing a sequence of behavioural states, 2) to *monitor* the resulting changes of the organism's manifestation in time. The performer monitors the organism's manifestation in time, perceiving some expected emerging properties. He then proceeds with a new action, influencing the organism to the next change of behaviour. The performer's actions on the machine are momentary. However, each action makes the system pass through changes lasting for longer time spans. Each behavioural state is left active for a period between five and twenty seconds, according to how long it takes for the desirable properties to emerge.

In the following simple example, I demonstrate the principle in practice. The graph of Fig. 6 expresses the evolution of system's states in terms of time (thin curve). The thick curve represents the final steady states that the system states approach. As the graph suggests, the system starts with a final steady state s_5, which will be reached after time t_2. The system passes through a series of states approaching the final state s_5. Nevertheless, the performer interrupts the systems behaviour before the occurrence of s_5, by setting the new final state s_1. Again, the system changes his tendency towards the new final state s_1 that will occur in t_4. Similarly, before s_1, he changes to a new final state (s_6). This time his lets the system reach s_6 in t_5. The system *stabilizes* in s_6 and until the performer sets a new final state, there is no change to the system.

IV.CONCLUSIONS

In this paper we demonstrated some approaches of electroacoustic composition based on Systemics. First, we show the connection of Xenakis with Systemics and more particularly Cybernetics. Xenakis, with the use of his Markovian Stochastic mechanism as the basis of his model, attempts to apply the hypothesis of second order sonorities. Di Scipio argues that the stochastic laws, which Xenakis is using to apply his hypothesis, are not capable of determining the emergence of second order sonorities. Di Scipio with his model replaces the 'closed system' of Xenakis with a self-organised system. This system represents a DSP able to control its own settings in respect to the interpretation of sound's perceptual values. All processes take place during the performance, using exclusively sonic material available in the concert space.

Regarding Di Scipio's approach, I explained that the composer's focus of control is deliberately put in one and only temporal level of organisation (the basic micro-

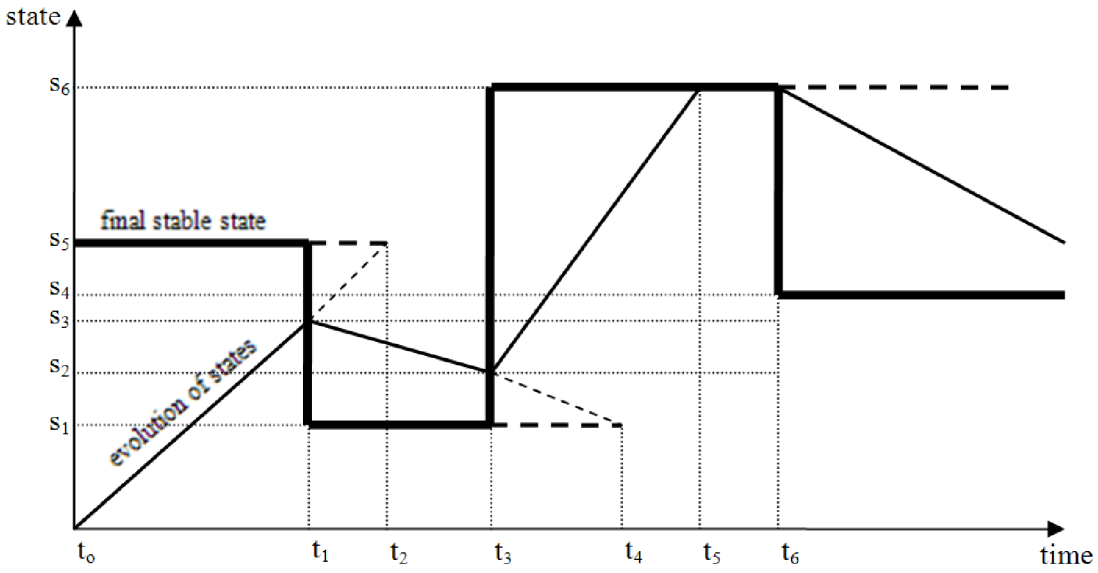

Fig. 6. The evolution of system's states

temporal level), and that this organisation is exclusively *bottom-up*. I also showed that Di Scipio's system lucks the multi-level processing which is characteristic of adaptive systems. I supposed that the reason for his persistence on designing only in a microstructural level may be to attain continuity among the different temporal levels of organisation. Also, I pointed out two conceptual contradictions in respect to his theory. The one was that, although the organisation relies only on the *microstructural sonic design*, i.e. on the basic level, there are cases where the system triggers a process that applies control over higher organisational levels. The other was that, although in principle is only the dialog between the system and the occasional space of the performance that creates the music, there are cases in which the performer makes changes to the input of the machine, establishing an interaction with it.

I defined self-organised music as the result of the interactions between some predefined structures and an occasional context of performance, through a particular interpretational model. I also attempted to create a general model of self-organised electroacoustic music, based on Di Scipio's model, interpreted through the model of Second-Order Cybernetics.

In the third section, I presented my work *Ephemeron* a self-organised system with the metaphor of a living organism. I made the distinction between its genotype and its phenotype to distinguish the 'electronic genetic code' from the manifestation of it in interaction with the environment. I formulated a hypothesis based on the systemic principle of 'equifinality and I show through the description of *Ephemeron*'s performance that it is possible to conduct emerging situations. Finally, I demonstrated that we can acquire control over these situations and their properties in order to use formal structure over time.

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