

ENORE ZAFFIRI  
*Selected writings*  
(1964-2003)

edited by Marco Ligabue



## *Introduction*

Marco Ligabue

In the early Sixties Enore Zaffiri also becomes interested in the new possibilities for music offered by technology. His work, which revolves around interdisciplinary research in various artistic fields, quickly begins to concentrate on the organisational possibilities presented by the structuralist approach. His objective is to isolate a principle that would allow for substantive interaction between the audio and the visual, a principle that would be based on a common structural foundation rather than superficial juxtapositions. This research interest constitutes a constant in the composer's work up until recent years and brings him into close contact with Teresa Rampazzi and Pietro Grossi, with both of whom he also develops a personal relationship.

The contributions included here, which mirror the cultural, social, and aesthetic climate of the Sixties, attest to the multi-faceted experience of the Turinese composer and his work, from those aspects most linked to creative expression, to those more explicitly theoretical, and finally to those of a didactic nature. We can thank him for the founding in 1964 of the SMET ("Studio di Musica Elettronica di Torino") to which numerous compositional activities and theoretical-aesthetic production would gravitate. And again, thanks to Zaffiri, an official course in Electronic Music would be started at Turin's 'Giuseppe Verdi' Conservatory in 1968.

We would like to bring to the reader's attention *Verso una nuova esperienza sonora* from 1965 and *Musica di ricerca* from 1967. These are two contributions that exemplify Zaffiri's thought well and which help appreciate analytical talents and intellectual rigour in problem solving. They reveal a well-rounded character, attuned to the comparative possibilities between music and technology; able to isolate the challenges they pose as they arise.

The writings included here cover the period from 1964 to 2003 and, although all have been published, they are practically impossible to find, just as in the case of the writings of Pietro Grossi and Teresa Rampazzi. In this case, all of this material has been completely revised by the author, whom we thank for this indispensable contribution.



## [I] *Origins of Electronic Music in Turin in the 1960s*

In the early 1960s a structuralist current drawing inspiration from Gropius' Bauhaus and Dutch De Still took shape in Turin. In this climate I began to consider the possibilities the new electronic instruments offered me. Finding myself faced with the dilemma of how to use sound material unconnected to any tradition, I saw two possible paths: either act through pure instinct or organise the material according to structuralist principles. I opted for the last possibility, and, thereby, postponed freer creativity with increasing experience and awareness.

In the meantime I founded the "Studio di Informazione Estetica" along with other aesthetic operators (Sandro de Alexandris and Arrigo Lora Totino) at 32, corso Vittorio Emanuele. The Center sought to define and promote awareness of interdisciplinary approaches to the various areas of aesthetics. This is how I came into contact with many artists from a variety of disciplines, among whom Pietro Grossi, who gave me precious advice while inspiring me with his enthusiasm.

I had come up with a base structure to organise acoustic space, which could also be applied to visual space. In this way I focussed on an interdisciplinary principle based on a common structure rather than superficial similarities.

In the meantime I let young people who were interested in electronic music use the Studio, thereby creating a course, after Pietro Grossi's in Florence, which was then added (1968) to the curriculum at the 'G. Verdi' Conservatory in Turin. Now after thirty years and after various other experiences intent on exploring the creative possibilities offered by technology, I'm taking up the 60s geometrical structure again to organise computerised images and sounds in a context I now call 'framework 2000'. By this I envision a partnership of sounds and images, which together develop and transform in time, a dynamic framework as opposed to the traditional static, unchangeable framework.

February 27, 2003

[2] *Introductory talk at the “International Review of Concrete and Electronic Music” held at the ‘La Bussola’ Art Gallery in Turin April 14, 1965*

Unfortunately Turin remained isolated from contemporary music life. There hasn't been a commitment to information. Hasty prejudices and judgements, the fruit of often superficial examination, have created a sadly provincial situation for music in our city. Not only do we reject avant-garde positions; but we still hesitate to recognise the historical vitality of a Schoenberg! The objective of these evenings is essentially informative and aims to shake Turin out of its absence in contemporary musical culture.

By contemporary musical culture I mean the engaged production of the last ten or fifteen years. Around 1950 the twelve-tone system won its battle after a brave struggle. Young artists moved in that direction, as well as musicians with a glorious past, take the case of Stravinsky, recognised and openly accepted the new poetics. If we look at the scores of this period, we can see how the composer took care to indicate the slightest dynamic nuances and the continual changes of tempo with the exact metronome indications.

Such pieces are of such rhythmical and technical difficulty that they often surpassed the possible limits of human performance, leaving little margin to the will of the performer. The composer brings all of the problems of artistic creation on himself.

The process of the gradual eclipse of participation on the part of the performer in the composition of a musical work has roots in Beethoven's époque. The music of the 17<sup>th</sup> and 18<sup>th</sup> centuries, in fact, left ample room for the creativity of the performer who often identified with the composer. The author didn't even annotate the character of the piece ((allegro, adagio) and left out the dynamic signs (piano, forte.) In the *Basso Continuo* just the lower part, the bass, was written with some numerical indication relating to the harmony. The performer took care of the rest. So too the ornaments and instrumental cadences were the fruit of the performer's invention. The performer worked in close collaboration with the composer in the birth of the miracle of sound. Then imperceptibly a tacit struggle began by degrees between the two protagonists of the musical event. Therefore, the performer began to draw the public's attention onto himself with virtuoso performances, while the composer tended to concentrate his content-laden ideas on the music even more, requiring the greatest faithfulness in

the reproduction of the discourse. After alternations lasting many decades, the struggle was resolved in favour of the composer. In the immediate post-Webernian period we have witnessed an almost dramatic situation as the performer was reduced to an almost mechanical role. The composer is now an almost absolute master in the musical field. The dream of replacing the performer with the new electronic instruments able to reproduce the musical idea precisely was about to come true. In about 1950 the Studies of Musical Phonology then operational were too few to satisfy the needs of the composers. Since creativity cannot stop, the evolution of music slowed down to a frightening degree. We saw a jump backwards of centuries, provoked by the fear of losing sight of man in the creative process. The performer returned to his magic role as co-participant in musical creation. To this gesture of protest against the composer, dictator and tyrant of the organisation of sound, corresponded an analogous gesture against the same organisation of sound then distilled in the complete serialisation of the parameters of sound. Enough of the microstructures, the macrostructures, the superstructures, i.e. all the scaffolding of the pointillists and their disciples: let us entrust the acoustic event to chance.

The score was reduced to mysterious signs indicating bands of sound, vague intensities and lengths. The performer took care of all the rest. So the last tenuous thread that tied us to tradition was broken; that is, the organisation of musical discourse that out of modality and tonality had found its last vital possibilities in the twelve-tone system and complete tonal seriality. And so musicians discovered Duchamp's Dadaism, now thirty years old. The strangest and most curious things came about which are still in turmoil today, in which the unpredictability of chance holds sway. An example: Cage's 'pieces' for radios turned on and off, erratic volume, no matter what they broadcast, following the signs of the 'composer'.

The habit of writing music on several pages leaving to the performer or performers the freedom to play one or another at will is still common. Even gesture is given an absolute musical value. To sum up: gesture, chance, the vibrant protest against the composer are all aimed at restoring an idol on the wane: the performer. At least the public sees something: a man handling his instruments on the stage as in the past. Even if the music is different; human beings are the same. There's another Paganini, no doubt less 'virtuoso'. who 'doesn't repeat' just like the great buffoon.

The various experiments in which sound, gesture, and action, tend to combine into a desperate search for balance are an absolutely necessary phenomenon of the contemporary musical adventure. The appearance of the machine, i.e. of new instruments that make music without soloists, orchestras and conductors, has upset many consciences. For many people music is born of the natural physical gesture of singing or playing – 'making music' in other words. For others music is the result of a musically conceived idea that comes to be through a compositional process. The possibility of making music on tape, without a performer, opens two completely new paths to composers: *Concrete Music* and *Electronic Music*. While electronic music substitutes old, traditional instruments with sounds created by the vibrations of tiny electric particles, concrete music exploits surrounding noises and sounds, reproduces them on tape, manipulates them, transforms them, and presents them in a denatured and

remixed state as the outcome of the intelligent sensitivity of humans. If we want to make a comparison, concrete music finds its correspondent in material painting, made of cheap materials ennobled by artistic expression.

In the great contemporary melting pot, it's hard to make out which of the great avant-garde musical currents will win out. It's true that the boundaries between aleatory, neodada, and gestural music, i.e. music that lives through the performer, and concrete and electronic music are not always respected. In fact, often combinations between these genres that determine hybrid forms are created.

Some say that concrete music is on its way out and that electronic music quickly consumed many of its possibilities, thereby compromising its future. Certainly in this last ten years, many positions have been reached and surpassed. In the vast field of electronic music we've witnessed the most reckless adventures. More often than not composers who dove bravely into the mysterious acoustic universe that opened up before them, let themselves be guided by the machine. The temptation of the fantastic, the amazing, the absolutely new effect, which these instruments encourage by the nature of their infinite possibilities, took the upper hand over creative ideas. But personally I believe that the stormy period is over. The errors make us want to rediscover that broken thread that tied us to tradition in order to tie on another thread that could mark the birth of a completely new language. The new instruments will be the irreplaceable means to beginning a rational exploration of the infinite world of sound. The struggle between those who bet everything on the human performer and entrust to chance the destiny of the music and those who still believe in the human possibilities of organising musical discourse in a logical and rational way is still going on.

Let's not make hasty judgements about the validity of one or the other tendency. Everything that was attempted, done, and continues to be attempted and done to develop musical creativity is always supremely valid, providing that man participates and lives in his époque with responsible awareness and profound commitment.



[3] *Excerpt from a talk given during the third evening of the “International Review of Concrete and Electronic Music” held at the ‘La Bussola’ Art Gallery in Turin on May 5, 1965*

On December 20, 1963 the “Spectra” Group was founded in Gand, Belgium. This group was connected to IPEM – the Institute for Psychoacoustics and Electronic Music –, which grew out of collaboration between Belgian Radio and Television and the University of Gand. Gazelle and Goethals figured among the founding composers at “Spectra”. The manifesto issued by the group contained the following statements: «...tomorrow’s Humanism will see the affirmation of a powerful group of data, theories, and points of view in constant flux and recombination like a visual and sound spectrum... Under the sign of this plurality, the Group now presents itself, rejecting any type of personality cult. The Work of Art alone is our focus of interest; the Work of Art in constant evolution. Spectra will not accept any kind of stasis, institutionalisation, or paternity. And whatever the tendencies of its members might be, Spectra remains a ‘young’ group intent on meeting the demands of tomorrow’s art... The members of Spectra propose to use the enormous amount of sound material now available, considering that the evolution of the form should necessarily follow each evolution of the sound content used...». In other words the Spectra Group aims at formulating a new type of music in which electronic and instrumental music could be combined thanks to a common, unifying philosophy, which seeks the synthesis of various experiences. It is important to keep in mind that this new working theory for music came after the aleatory storms and shows the need for a new orientation to help overcome the deadlocks created in music by seriality and randomness. It is also interesting to note the need for coordinated teamwork, extending the dialogue to experimental visual art groups.

From September 1-5, 1964 an international conference devoted to the problems of electronic instruments in music was held again in Gand. Schaeffer, Xenakis, Gazelle, Pousseur, Koenig, Pietro Grossi, for Italy, and others participated. When Grossi told me about the conference, he commented: «everyone held on to his own ideas».

I want to tell you about these facts to underscore what a critical moment electronic music is undergoing today. After the first ecstasy of new discoveries, musicians got lost and couldn’t figure out which way to go. Right now we can see an interest in returning to traditional instruments, in forging a partnership between various means of creating

sound and hoping to save by this mediation both electronic instruments from the tedious though enormous variety of colourful noises, and traditional instruments. This is a compromise. In my view the cause depends on the collapse of the language of sound, which hasn't been able to formulate yet the premises for a logical discourse that could contain the germs of future evolution since equal temperament was superseded.

With this *Review* I have tried to give you a general update on concrete and electronic music production throughout the world in the last ten years. You can see for yourselves what kinds of questions musicians face. Pressing problems have emerged with the use of new means, which definitely represent a point of departure, rather than a point of arrival of the musical experience. It's important to be clear about this. The means of producing sound and the place, means, and manner of listening are revolutionised. The ritualising element, represented by the performer, is eliminated. The traditional discourse, hinging on melody, harmony, and rhythm has disintegrated. Everything seems different from preceding musical culture. Music means something else. But what?

This is the anguished question the public asks these musicians. They're asked: «What are you offering us in exchange for the traditional language you consider exhausted? Up till now you've offered us mostly noise, in many varieties – pleasing and unpleasing. But they don't yet seem to be the basis for a renewed musical language for the future».

This is a fair statement, though marred by a critical shortcoming. In fact, the discovery of noise in concrete and electronic music signifies a new opening in the world of sound up till now relegated to futurist experiments with the Russolo's noise-machines. Strictly tied to the possibilities offered by the new instruments, this discovery provoked a radical break with traditional acoustic instruments and, thereby, the conscious exclusion of musical sounds in favour of the dominance of so-called coloured noise in the acoustic field.

The French and Germans we've heard in earlier evenings have done the same thing.

Tonight we'll listen to music that isn't completely 'noise-based'. Some pieces give a bit more space to sound. We can see how in Belgium, Poland, the United States, and Japan, the search for a new acoustic language was guided by different intentions. The results are what they are, perhaps questionable from the point of view of aesthetics, but nonetheless very important, if we consider three continents participate in such a lively problem as the formulation of a new musical discourse using new means, overcoming traditional cultural barriers inherent in each people, as if aiming for the birth of a universal musical language.

Therefore, the music that has emerged in the last ten years represents a very important document in the History of Music for the future, the labour of musicians struggling with still incandescent, untamed material, bold explorers in uncharted, chaotic lands, who nobly seek to dominate it to prepare for a new era in music.

These days we see that every truly committed musician in this area is trying to create his own poetics. Through contacts with various composers and their works, through dialogue with scholars from a variety of artistic and scientific disciplines, but above all, with the help of an attentive and informed public, I think we can arrive at

a radically new and no longer experimental formulation of musical art in the (I hope) near future.

In conclusion I again give the floor to the “Spectra” manifesto:

[...] We don't pretend to have a monopoly on truth: who would dare consider themselves infallible? We're familiar with all our detractors' arguments, informed or ignorant. But we ask music critics, in their roles as informers, to help us together to discover the meaning of this new sound horizon, a horizon still largely undeciphered, but full of promise. We can't love a language if we don't know it. It depends on all of us to encourage listeners to familiarise themselves with a language that was unknown until yesterday. Only then will they (listeners) be in a position to appreciate consciously the value of the works offered to them.

[4] *Excerpt from a talk during the fourth evening of the “International Review of Concrete and Electronic Music” held at the ‘La Bussola’ Art Gallery in Turin on May 12, 1965*

Contrary to what most people might think, Italy has a primary role in the field of electro-acoustical music, above all thanks to the Milan Studio set up by Italian Radio and Television and directed for a long time by two outstanding musicians: Bruno Maderna and Luciano Berio. In addition to the Milan studio, an electronic music studio equipped by the Rome Philharmonic Academy was founded in Rome in 1957. The Studio di Fonologia Musicale (Musical Phonology Studio), *S2FM*, set up in Florence by Pietro Grossi has already been operating for some years and boasts impressive equipment considering the fact that it was set up with personal resources. This studio recently moved its offices to the Florence Conservatory, which intends to offer a special course in electronic music next academic year. Last year (1964) I founded the Studio di Musica Elettronica di Torino (Electronic Music Studio of Turin) *SMET* with my own resources and promoted this *International Review of Concrete and Electronic Music* under this banner. There has also been word that Teresa Rampazzi is going to create a studio in Padua. And in Rome, Vittorio Gelmetti has been active in broadening his experiments in electronic music in documentaries, film, and exhibit sonorisation using equipment made available by the Ministero delle Poste e Comunicazioni (Ministry of Postal and Communication Services).

In brief this is the nature of Italian participation in the area of electromagnetic music.

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The Milan Studio has hosted famous foreign and Italian composers, among whom Pousseur and Luigi Nono.

Unfortunately, after the first promising results that brought the Studio to the attention of the world, it has practically stopped functioning. Berio and Maderna work abroad. And we have no longer heard anything about the Rome studio for quite a while.

Evidently the lack of activity in these studios is a clear symptom of the crisis that has struck electronic music, a crisis that I pointed out last week in my introductory talk on the third evening of this *Rassegna*.

Nowadays the important contribution that Italy is trying to give to the field of electronic music is evident in the clear position a small group of musicians has taken. Faced with the contemporary crisis in the field and intent on understanding the causes of such stasis and return to traditional acoustic instruments—not to say the total abandonment of new instruments, they have re-proposed the problem *ex novo* by learning from the experiences of their predecessors. The direction of the *new electronic musicians* (let's call them that!) is not at all a rejection of either tradition or preceding electronic experiences. Harking back to Webern's inheritance, they are also trying a new path towards the discovery of new expression with the new instruments.

In all areas of artistic expression, artists find themselves faced with a choice: either give up experimentation and move back to more comfortable positions; that is, repeat already existing elements in the hope of rediscovering undiscovered expressive values and garnering greater public consensus or, aware of the attendant risks and dangers, try to enter the philosophy and reality of our times.

At the moment, in the area of the use of new instruments, we can identify two currents: on the one hand, those supporters of an aesthetic direction we can call traditional that has essentially led to the present crisis and the abandonment of new experimentation or to the combination of traditional instruments and electronic devices and, on the other hand, those whom I call, as I said before, the *new electronic musicians* in order to make it easier, who take up the problem at its origins and try to give acoustic material a new direction. This approach hinges on a different and more rational use of electronic devices, inserting itself in the *structuralist current* that, at the moment, is being re-evaluated in all areas of art from literature to the visual arts and music.

The different application of the new tools consists in the systematic experimentation of the expressive possibilities of electronically produced sound by means of mathematical processes that set up a pre-established order of experimentation.

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This is Pietro Grossi's approach. He delves into the tiniest acoustic particles, dissects acoustic material, trying to isolate the pulsating cells that animate each sound as if he were using a microscope. One of his experiments is to divide the octave into seventy parts, on which he superimposes the different frequencies according to a mathematical principle (he uses the computers at the University of Florence for the calculations).

This orientation might seem like a laboratory exercise, but for Grossi every sound that he creates in this way represents a completed, aesthetic event in that sound mass mixed in this way contains the potential musical elements to make it self-sufficient. Even if they might all seem equal to the untrained ear, each one of Grossi's sounds has its own timbric property and inner rhythm, deriving from the concrete pulsation, which comes from the phenomenon of beats.

These long, endless sounds, which launch themselves into space without beginning or end, can be compared – I'll try to make some comparisons to help render the idea – to certain paintings made up of one single colour spread over the entire surface of the canvas, like Antonio Calderara's works. If Calderara's choice of a single colour

that takes on an independent life with its luminous vibration and intentionally lyrical expressive energy, contained in a mathematically-controlled space, is enough for the self-sufficiency of the work, then we can say the same thing for Grossi's sounds.

We have to admit though that while these experiments have already gained popular acceptance in painting, this is the first time in the field of music that we have considered a sound projected into space 'music'. Grossi's experiment then represents the most extreme point beyond which we enter into the kingdom of absolute silence. However, this represents a point of departure, perhaps the first letter of a renewed acoustic alphabet. I would also include myself in the structuralist current. Taking isolated sound and silence both as fundamental acoustic elements, in my experiments I try to discover a succession of sounds by means of a geometrical process that allows me to organise sound in such a way that the various parameters find the same applications. This method can also be adapted as the structural foundation for visual experiments and can have interdisciplinary applications in various arts.

In the course of this *Review* we've seen that electromagnetic music has difficulty entering concert halls because of the lack of performers. That is, since there is no longer an interpreter-mediator we find ourselves before a more abstract listening experience in which the relationship between performer and public is now substituted by the loudspeaker and the public lacks the ritual relationship with the former.

This is because, in addition to being a musical phenomenon, a concert is a real spectacle, in that the performer playing his instrument creates visual interest, in a certain way, and the public often displaces the value for the musical event from the content of the music to the virtuosity of the one who performs it. Therefore, we need to find a remedy to this shortcoming in electro-acoustic music.

In these last few years, a profitable collaboration has sprung up with experimental groups in visual art that work with mathematical and geometrical structures. In this way, electronic music has found its way into art galleries and the two visual-acoustic elements tend to blend into one form of expression. Such are the "Proposte strutturali plastiche e sonore" ("Plastic and acoustic structural proposals") organised by the *Polena* in Genoa and which, following an itinerary through the main Italian cities, are now in Turin at the Galleria 'il Punto'.

During the exhibit on Michelangelo in Rome, Vittorio Gelmetti was asked to compose an electronic work entitled *Modulazioni per Michelangelo* in collaboration with the exhibit designers for the arrangement of the wall dividers, based on certain simple elements of combinatory calculus. Recently, at the Danese Gallery in Milan, Grossi and Munari presented a visual-acoustic object, the *tetracòno-tetrafono* (*tetracone-tetraphone*), that mutes lights and colours according to a specific mathematical structure. There are various examples of interdisciplinary experiments in the arts abroad, too.

It is obvious that this music can find an application in other art forms like ballet, theatre, and cinema. What is worth underscoring is that music should not be pretext or background, but should be born of the same structure as the visual work, creating an organic set of images and sounds that blend with each other.

Even if listening to this music leaves us perplexed, I want to assure you that the creators, who worked in the same direction before meeting, have taken on the challenge

with real commitment, underlining that fact that their experiments are 'proposals' and should be taken as such. The field left to imagination is circumscribed for now. In this case, imagination transforms itself into intuition; that is, to intuit the possibilities of new elements which might favour the germination of new dimensions in sound.

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We don't know if the road we've undertaken is the right one, however participation in the urgent problems we face in our times is certainly worthwhile.

[5] *Reflections on the idea of interdisciplinary relations between sound and visual elements in structuralism\**

The interdisciplinary connection between acoustic and visual object must come about inside an operational process and not on the surface. Every discipline lives off its material in that the materials adopted determine its results. The only correlation should be apparent at the base structure, which determines the future coordination of elements in both objects. No epidermal connections, where sound becomes a metaphor for the visual or vice versa, but an analogue distribution of discursive elements that find their actualisation first in one then in the other discipline. Each one is a discreet discourse even though they are strictly related.

The base structure establishes the rules for the development of events. The structure is not absolutely deterministic but an instrument in the hands of the operator and can assume infinite compositional possibilities. Perhaps the problem of temporal dimension (the acoustic object occurs in time, the visual object is static) will never match. We have to turn to film.

The visual object, however, can have its temporal dimension if we are talking about a cinematic object.

\* Excerpt from a piece of writing of May 1966.



## [6] *Research Music: Toward an Operative Methodology*\*

Is it possible to construct a methodology that would serve to organize acoustic material produced by electronic means? To answer this question we must first clarify the role of the operator vis-à-vis his proposed line of research. We frequently find that the musician who is the least prejudiced with regard to musical tradition boldly confronts experimental electronic music without realising the extent of his self-confidence. Mistaking impromptu experiments that totally lack a theoretical base for research, he derives topical pleasure from wading in a world of acoustic sensations, a world that he will soon abandon because it does not offer him the general agreement he had hoped for. Establishing a clearly formulated methodological approach guarantees the seriousness of the research. The mental preparation required of the operator – more intellectual or moral than technical – is another basic condition of this type of discourse. The operator must be willing to forfeit an experience that has exclusively artistic goals in the hopes of discovering heretofore unknown acoustic relationships. Only by accepting these prerequisites is it possible to begin to formulate a methodology for organising sounds produced by electronic instruments.

Research in this field may most simply be divided into two basic areas defined as pure research and applied research.

By pure research I mean painstaking inquiry whose goal is to distinguish acoustic values that we may identify and categorise. Given the extraordinary breadth of the field, one must occasionally limit the radius of this approach to specifically defined areas. This type of research has no limits. It produces acoustic material that has two goals: to create an awareness of new acoustic elements, even in a state of pristine enunciation, and to provide new material for applied research. It is worth remembering that until recently pure research was limited to what was produced in the acoustics laboratory. Fortunately this situation is improving and research is now extending beyond the expert's scientific skills to the sensitivity and intuitive skills of the musician who can isolate the potentiality contained *in nuce* in phenomena formerly considered

\* Paper held at the conference sponsored by the National Association of Musicians, Milan, May 1967.

to be outside the sphere of acoustic discourse. The importance of this type of research has yet to be correctly evaluated. Musicians and scholars have considered it too dry and useless in relation to the goals and aims of any aesthetic necessity.

In my opinion, however, the future of electronic music as an autonomous form of language depends exclusively on this type of research. What type of methodology can be developed for carrying out such research? Pietro Grossi was the first to consider this aspect of electronic music. In this field it is mathematics that offers us the strongest guarantee. The format of most recent research points in this direction. Since there is an infinite universe of numbers, the possibilities of coordinating sounds are also infinite. Moreover, hasn't the language of music been an outcome of mathematics since antiquity?

Now let's discuss applied research. This is the development of acoustic material that originates in pure research with the intention of formulating a discursive hypothesis. I feel that this type of research absolutely requires a rigorous structural methodology.

The term 'structure' itself is vague and overused. Each operator fashions a notion of structure according to his own ability to perceive a set of structural relationships. Although structure and random occurrence are diametrically opposed, they are also inseparably linked. A specific methodological position must be found in order to ascertain the extent to which the finished product may be subjectively 'extracted' in relation to its structure. By creating the unstable trace, a larval of a structure, we can leave the greater part of the resulting event to chance. Vice versa, by creating a more rigorously defined structure, we dramatically limit the possibility of random occurrence. I prefer the second hypothesis. The most useful aspect of a strict methodology in research is that it provides the relationships we need to develop the elements we want to study. It also circumscribes the range of inquiry within specific limits. Currently, interest in formulating new linguistic relationships prevails over more artistic motives. However, these creative catalysts are not completely excluded, since the structural component of a work virtually embeds its aesthetic values.

The type of structure I would now like to present is a geometric model. From this flat geometric figure one may derive the necessary relationships in order to organise simple acoustic elements. The geometric figure may be built up from a mathematical formula or a graphic structure may be derived from it, whose sole function is to offer data and relationships for further research. In any case it is essential to recognize that the figure is not a full score but rather an organisational schema, that is to say, a graphic element with a purely structural function. When we speak of 'reading' a figure, we mean the process of extracting a nexus of relationships from it. Its very structure determines the outcome of events. It is a tool in the operator's hands and not an absolute determinism: it can suggest infinite development possibilities.

However, it must not be construed as anything other than a means of weaving together a fabric of linguistic elements. The inquiry I have begun to pursue this operative method is derived from simple elements: sinusoidal sound, pulses, and intensity. Using mono-cellular material, in other words, discrete independent single-sign elements, we are unable to discern recognizable formulas (modules - themes): each 'sign' (acoustic element) is an end in itself, but its *raison d'être* is to be found in the context

of the structural foundation of the object. Since structure is a means to an end and not an end in itself, we are proposing a working methodology that will allow us to apply a rational procedure to linguistic material, thereby excluding the possibility of raising the notion of structure to a mythic element. Our goal is to formulate a working hypothesis for a type of discourse whose elements constitute an organic fabric that is constantly being created and transformed. This fabric offers us a perception that is 'torn' or extrapolated from those other structures that hinge on the logic of traditional discourse. As such it must avail itself of the difference between the molecular particles of the given linguistic material, mono-cellular units that form an extraordinarily rich body of internal metamorphoses. The individualisation of structure should not condition the capacity of fruition of the discourse (still awkward – would «the ability to enjoy the discourse» work?), but the very new meanings generated by the organisation of linguistic elements in this context. The concepts of repetition/variation, antecedent-consequence, that is, the advancement of formulas developed in the discursive continuum to which Western culture has accustomed us to consider understandable a language of elements expressed only in terms of its own logic, gives way to a certain 'discontinuity' which is not chaotic but rather «...basically, it is a continuum of discourse if we put aside the rhetorical model we're accustomed to adapting our listening to». (See Roland Barthes, *Literature and Discontinuity*, Einaudi, p. 227.)

Here the sign frees itself from the symbolic imagination to become more than a classifiable element of communication. As a sign-symbol, it takes on the character of affective participation means. In this sense it is excluded from the paradigmatic imagination, which implies a heightened attention to development and 'variations'. The syntagmatic consciousness reflects the signified of the sign used in the context of the structural agenda. As Roland Barthes writes, «The syntagmatic consciousness is a consciousness of relationships that connect the signs to each other at the level of discourse itself... It is a consciousness that puts aside the meaning more easily: it is a structural consciousness more than a semantic consciousness... We're dealing with a 'stematic' imagination, a sequential or web consciousness: and the dynamics of the image comes to be a coordination of mobile, replacement parts, whose combination produces a meaning, or more generally, a new object. Thus, we're talking about an image that essentially constructs and also functions». It includes all works «in which the performance is constructed from their very fabrication, understood as the organisation of mobile and discontinuous elements» (*The image in the sign, ivi*, p. 243).

Again according to Barthes, syntagmatic consciousness excludes development. In other words, «there is no variation, only variety... Structural unity exists only as diminution, i.e. in relation to other parts. These parts are, and have to be, such perfectly mobile entities that in moving them... the author generates a kind of huge animated body, whose movement is in perpetual transfer, meaning the most finely articulated armour, in which the joints, at the slightest jolt... paradoxically produce the most fluid movements» (*Literature and Discontinuity*, Einaudi, p. 227).

At this point I would like to emphasise the subtle but important difference between serial and geometric structure. This distinction is decisive to bring into focus the proposal of this type of operative methodology.

As Webern writes, «once the series was born transformation and development began right away» (*Toward new music*).

Referring to total serialisation, Eimert affirms that «...the essential thing still remains the first order of pre-selected variation» (*Manual of Twelve-tone Technique*, Carisch Milano, p. 79).

In his *Structures*, Boulez writes that «sections Ia) and Ic) were the first to be composed; they were the result of developments (of variations) created around a structure that was inherently rather simple...».

Seriality is based on the enunciation of relationships that constitute the preliminary development of variations of different elements. This development and these variations constitute the body of the composition. The enunciation of a series or, in other words, of relationships, with no subsequent development or variations is not a musical work. On the other hand, a geometric structure does not subtend these units to this type of development by way of variations, although it is by nature a project that establishes associative rules between predefined units (of course, these rules apply only to this project.) Geometric structure has no development, since its very enunciation corresponds to the whole piece, the object in itself.

If I may be allowed, I would now like to repeat my remarks on the meaning of this type of theoretical work in the paper I presented at an earlier conference a few months ago. An acoustic event presented in this fashion has no other meaning beyond its concreteness. In the very act of fruition, the physical phenomenon transforms itself into a sensorial one; it is recorded by our senses, which then transmit the information received to the mind.

A pre-existing emotive meaning is not attributed to the event, but rather a clearly defined structural organisation that can be used for the goals of any research into the vast unexplored terrain of human consciousness. The receiver is free to choose any subjective emotional meaning s/he desires, conditioned only by the potentiality of his or her intellectual and psychic understanding. In this way a double correlative function is set up between operator and receiver: the former provides the material that has been developed and the latter, in the very act of receiving the information, 'humanises' it and transforms it into emotion. The choice of certain material – its development and organisation according to a deliberately chosen structure – confers a consciously chosen point of view on the operator in relation to the event, thereby removing the results of the research as much as possible from the realm of chance. And it is the fullness of this responsibility for our actions that interests us in its supremely human dimension. On that note, I would like to conclude with a remark by Barthes that seems particularly meaningful in this context: «A work of art is what man saves from chaos» (*Structuralist Activity*, *ivi*, p. 248).

[7] *International Convention of Experimental Centres of Electronic Music, Florence, 1968\**

During the 31st Maggio Musicale Fiorentino, an International Convention of the Experimental Centres of Electronic Music on the initiative of Pietro Grossi took place in Florence from June 9-14. Fifty-two papers with 22 representatives from every continent were presented. Auditions, concerts, and an exhibit of graphics, scores, and publications took place during the convention. Underscoring the indisputable vitality of this area of contemporary music, the event has assumed the character of a valuable cultural event given the nature of the issues involved and the note-worthy artists present. It is practically impossible to give a detailed account of the topics dealt with considering the breadth of material. We will deal only with the most significant aspects and give particular attention to the issue of teaching methodologies, one of the convention topics, and most relevant to this publication.

The Opening Session was presided over by the Director of the Florence Music Conservatory, Maestro Antonio Veretti. Prof. Luigi Rognoni introduced the work of the convention in an historical synthesis of the evolution of musical language from the crisis in tonality, by means of Wagnerian chromaticism, to its undoing into the expressionist experience and the formulation of the twelve-tone system, which preserved intact the twelve tones of the tempered scale. With the gradual waning of the expressive possibilities of these sounds, the advent and use of electronic instruments in musical practice, which enrich the acoustic horizon with new material, find historical justification. However, with subtle, critical analysis, the speaker did not hesitate to underscore the possible aesthetic deformities, which could come from these new musical experiments. In order to synthesise and clarify these points, the topics were divided into two categories: those of a technological character and problems of a more general character, such as: aesthetics, physics, psychoacoustics, biology, sociology and communication, composition and graphics, functional music, teaching methodologies.

The technological issues involve the description and use of new equipment, including computers, for producing electronic sound. Among the semi-automatic synthesis-

\* Published in «Rassegna Artistica», of the Ministry of Public Education (Italy).

ers the practical demonstrations of two instruments presented: the 'syn-kef' developed by Paolo Ketof of Studio R7 in Roma, a valuable, small instrument that can be used in its own right as an instrument for performing live and recorded electronic music and the 'moog' introduced by Emerson Meyer of the American Catholic University of Washington, D.C., similar to the former but larger in size and more powerful. These two instruments, which can be automated by using external programming, incorporate the properties of an entire electronic music studio.

Gustav Ciamaga of the University of Toronto (Canada) described at length the use of 'sequencers' in music. These small instruments can be interconnected and are completely programmable. Unfortunately we were not able to see a practical demonstration, since comparison with large, fast computers would probably have worked in their favour. Eugenii A. Murzin, from the Moscow studio, aroused lively interest with his synthesiser, made up of 720 *oscillators* each spanning 7 octaves, divided into 72 sounds.

The author justifies this division on physical and physiological grounds, building on a theoretical principle of sound classification that takes into consideration the slightest difference perceptible to the human ear between one sound and another. That difference is obtained from the relation between the natural third and the tempered third intervals. The original and extremely practical programming and automation of the electronic equipment makes use of a transparent plate, covered with a layer of paint to allow the composer a surface on which to write the music. Etched in this way the plate becomes the matrix or the memory for the instantaneous reproduction of the acoustic event.

In a series of examples, James K. Randall of Princeton University (USA) addressed recent acoustic experiments carried out in the US using computers both as aids to musical composition and tools for reproduction and performance.

Kurenniemi Erkki of the University of Helsinki (Finland) discussed research using remote terminals applied to music. These terminals could be understood as devices comparable to the telephone by allowing remote connection to a main frame. These terminals would allow us to connect from home for a modest subscription fee and use a computer to produce music. In Europe terminals of this kind are being used in industry at the present time. The Finnish experiments are aimed at creating a converter, which can convert digital signals into sound according to all necessary requirements of the various acoustic parameters.

The theme of computers reached its greatest interest level with Pietro Grossi of S2FM in Florence, due in large part to the practical demonstration preceded by the presentation by the engineer Nazareno Condulmari on the Olivetti-General Electric ge-115 computer. Grossi demonstrated the present and future possibilities this equipment offers the field of music. In the simplest way, we see how these devices can be used to produce music. The computer can convert into sound the electrical impulses that circulate in its circuits. The composer selects those that serve his purposes and using the appropriate code communicates them to the computer via punch cards. Performance occurs when the composer gives the command to transfer this data to the central unit. The loading and transfer speed is surprising. To demonstrate this the speaker used as an example Beethoven's Ninth Symphony, which is made up of some

250.000 sounds. The computer can set up 5 pieces of the same complexity in a hour. According to Grossi «the introduction of computers is approaching a truly new phase of knowledge and application in the world of sound».

He considers the computer a means of relieving the musician of «the unrewarding work imposed by technique on traditional instruments and consequently offers the possibility of greater refinement in intellectual work, which is the ultimate aim». So, for those who fear the tyranny of the machine over man, Grossi underscores that «only creativity, entrusting to the machine the execution of his programs and realisation of his ideas» will be reserved for man.

Now let's look individually at the more general problems. In his lecture *The tape recorder: necessity or temptation*, Hermann Sabbe of the IPEM (Ghent, Belgium) poses the problem of musical aesthetics created by the use of electro-acoustics. The tape recorder has put the composer in direct contact with the acoustic material, depriving him of the need to mentally foresee results to the disadvantage of imagination. The negative aspect of the ease created by the tape recorder has been the abandonment of the search for acoustic 'symbols' in favour of acoustic 'icons' (images-effects). In reality we've moved towards imitative aesthetics, towards acoustic mimesis. Imagination will become an indispensable necessity with the evolution of automation. If, by impoverishing creative capacities, the tape recorder has brought the composer closer to acoustic material, the computer will estrange him with the advantage of encouraging the composer toward a greater sense of responsibility through greater creative freedom.

Fritz Winckel of the Technische Universität in Berlin and Vittorio Consoli of Studio R7 in Rome dealt with topics relating to physics. Both lectured on problems relating to environmental acoustics. Certain characteristics of spatial illusion in electronic music could determine the creation of new sound environments. Such characteristics consist of the use of the possible illusory movement of electronic sounds, such that they could execute in theory true topological tracks. We are not speaking here of stereophonic effects in the usual sense, but rather of mobile acoustic properties aimed at creating a new dimension in the world of sound.

Leo Küpper of the "Studio de recherches et de structurations électronique auditives" in Brussels, discussed psychoacoustics and the theory of information applied to auditory perception of music. Psychoacoustics is a developing science devoted to the study of psychic reactions to specific acoustic phenomena relating to music. For example, a sinusoidal sound of a given volume and intensity over a given period of time, which varies according to the listener, is no longer perceived by the ear. However, the slightest interruption is enough to allow the ear to re-establish equilibrium. These studies highlight the importance of the subjective psyche in the choice and subtle combination of elements in musical discourse and in the search for balance and formal proportion in composition.

In the field of biology, Manford L. Eaton of the University of Missouri at Kansas City (USA) presented a curious theory on bio potentials and spontaneity in music involving the exploitation of electrical impulses in the brain and their translation into sounds. The electrical current produced in the brain, which undergoes incredible psy-

chic variations depending on the information received, can create music spontaneously in humans through their emotions.

The theme of sociology and communication was introduced by Abrams Moles (Paris) who dealt with the problem of the relationship between musical creation and the computer by highlighting the fact that, in the current era of consumption dominated by mass media, musical creation is becoming less and less of a finished, artistic product. In order to satisfy increasing demand, the computer represents the most appropriate means of creation for a product aimed at mass communication. We cannot deny or hide from the evolution of mechanised culture. In order to improve it we need to act in the area of pedagogy, by creating research and training centres to facilitate the gradual progression of culture and the level of taste.

At a roundtable discussion Henri Chiarucci of the ORTF (Paris) presented the convention with proposals for the modification of the structures of audio-visual communications in general, in relation to the needs of contemporary consumer society.

Teresa Rampazzi of the NPS (Padua) also addressed the topic of communication. She maintained that acoustic research ought to be conducted at the level of perception only and should not bend to concerns about production and consumption, since research ought to be understood as a message.

A group of speakers treated the problem of musical composition by presenting their individual theories or describing some of their works.

Karlheinz Stockhausen of the WDR in Cologne described and played two of his compositions. Both pieces use basic non-electronic acoustic material. In the first piece, *Telemusik*, the composer uses oriental songs, which are filtered through a program and elaborated electronically. In the second, performed on traditional instruments, the performers execute a compositional scheme aleatorially, using stylistic elements of the open work. The sounds of the instruments, captured by microphones, are elaborated with ring modulators. Working from a mixer, the composer regulates acoustic levels and *mixes*.

Kannis Xenakis of the University Indiana at Bloomington (USA) dealt with the problems of automatic composition via stochastic or probability theory calculations.

A collaborator of Gottfried M. König's of the University of Utrecht (The Netherlands), presented a paper on the use of computers in composition and in musical experiments carried out in teaching.

Istvan Anhalt of McGill University in Montreal (Canada) described his composition *Cento* in which electronic acoustic sources meld in the tight weaves of phonetic counterpoint.

Josef Patkowski of the Warsaw Radio Studio presented the work of a composer from his studio, L. Schoeffer, which is interesting for the graphic layout placed in direct relation to the acoustic outcome. Specific graphic symbols correspond to common electronic sound effects, such as the crackling of white noise, constellations of impulses, etc. In this way the composer can write his score and send it to the studio for performance. Obviously the outcome will be approximate, just as the graphic symbol is approximate.

The Russian Murzin also dealt with the issue of graphics. By introducing particular signs to the traditional notational system, the 720 sounds he uses in electronic practice can be shown on the music line.



James K. Randall (see above) also described his composition *Tema con variazioni* for computer violin.

Ivan Stadtrucker of the Experimental Television Studio in Bratislava (Czechoslovakia) spoke on functional music and the use of electronic sounds in cinematography.

The Italian Gino Stefani brought out the role of recorded music, especially electronic music, in the celebration of the Christian liturgy. This type of music, which precludes the theatrical ritual of performance, conforms to the Church's conception of music at the service of the liturgy itself. Its outer space-like character is particularly suitable for creating a mystical environmental space.

Representing RAI-TV in Milan Angelo Paccagnini provided a chronological synthesis of RAI-Studio production as it has moved in two directions: independent music or work of a purely musical nature and functional music intended for use in radio and television project and easy listening.

In my lecture on teaching theory, I presented a project on functional music, aimed at permanent sonorisation of interiors (museums, shows, exhibits, etc.) This music should be understood as moving in time; in fact, theoretically the project would run for a year. The sound event modifies gradually in relation to the months, days, and hours. Each instant has its unrepeatable sound, which blends with the ambient light to create a vital 'presence'.

Drawing on my work at the SMET in Turin, I dealt with the topic of teaching. Teaching technique in the field of electronic music is important for two fundamental reasons: on the one hand, it is a tool, which acts on a large number of people rather than on the isolated individual; on the other, since its principle must be knowledge rather than aesthetic intention, it becomes the focal point for all research surrounding the problematic of electronic music.

In the first case it promotes information and historical documentation on a vast scale. That is to say, it functions as a work of dissemination and critical analysis, which would be impossible to conduct at a high level through other communication channels.

In the second case specialised centres for expert training are created to which a sector of the particular field of interest will be devoted. This field would comprise the codification of a proper acoustic organisation of electronic instruments, i.e. research into new linguistic-formal fundamentals and experimentation with new electronic devices like computers.

In the second place, the task of finding new information channels and new consumer environments.

Given the nature of the problem, young experts from other disciplines would need to collaborate with the musician: physicists, psychologists, biologists, engineers, architects, etc. with each working in his/her field of specialisation.

At the teaching level, we can establish two general directives: one involves the possible formulation of a method for organising the acoustic material provided by the electronic instruments in a discursive context. The other is inherent in the use and function that electronic music should take on through locating new relationships between product and consumer. I deal with the first problem in my book *Due scuole*

*di musica elettronica in Italia* (Two Schools of Electronic Music in Italy), recently published by da Silva. On an experimental level, I tried to outline a linguistic-formal research methodology aimed at newcomers to electronic music. The method aims to provide gradual contact and progressive acquisition of still immature (though organised and uprooted from the usual expressive and formal models) acoustic material.

After the experience of these past twenty years, there is no doubt that the expressive peculiarities of the electronic patrimony need to be organized methodically to prevent the composer from being drawn into the trap of effect by direct contact with the acoustic material provided by the use of the tape recorder (see Sabbe's paper.)

Getting beyond effect cleanses electronic music of complacent acoustic surprise, while bringing it back to the essential quality of elements that take on the prerogatives of truly valid dialectic. However, defining acoustic phenomena should not be limited to a simple listing of physical, acoustic characteristics. At various stages, it should involve experimentation of the relationships between the various elements in more complex yet verifiable acoustic phenomena. By operating in this way, we avoid the pretence of realising an aesthetically complete work in favour of creating raw material that can be elaborated later and the premises for a kind of work that, perhaps in the future via new intuitions, could point to a more evolved language.

The use of main frames in the music field will encourage the gradual and continuing development of a mentality and a sensibility that will identify composers more with architects than painters. In fact, composers will express their creativity through 'projects'.

However the computer will change the concept of functionality and fruition of new acoustic products. I imagine that this new instrument will restore the role of the very character who played such a large role in the spread of classical music: the dilettante. In fact, if we could realise the project that foresees a large centralised computer, connected to private homes via a terminal (see Erkki's paper,) we would witness the phenomenon of the amateur who makes his own music in *his own* home. The role of teaching is also fundamental in this aspect. We need to train experts capable of teaching others how to compose electronic music. And this is an important and urgent aspect that affects the problems of dissemination and fruition. As long as the equipment remains the privilege of a few, until the educational system assumes its formative and informational role in the music sector, until general and specialised publications are promoted, electronic music risks remaining the domain of rarefied laboratory experimentation or becomes fossilised in science fiction-like acoustic images.

We need to breathe life into this material by finding and inserting it into the right channels to meet the most important needs of contemporary cultural life. To my mind the most positive aspect, the vital essence that electronic music must strive toward is the restoration of a new problematic in the relations between the work of art and the public; that is to say, to consider the use and function that new acoustic experiments might suggest and carry out.

If we want to take stock of the work of this convention, we could say that we are moving into a new phase in our field shaped by the use of computers. We have not talked much about aesthetics. When we have, we have highlighted the causes that have

most obviously determined stagnation in the past in certain stereotyped and often stale situations marked by heavy-handed acoustic mannerism. With the new technologies we are moving toward a total automation that will transform the way of making music from the bottom up. This will free the composer from the obstacle of manual ability and often-involuntary conditioning, which are derived from direct contact with acoustic material. He will be able to dedicate himself exclusively and unconditionally to the wider field of reflection and creativity. While physicists are isolating new horizons in electronic sound that will encourage the realisation of new ambient conditions for listening; while psychoacoustics carries out research to establish the parameters of acoustic perception; while composers experiment with new organisation of sound, we are working in the area of pedagogy to train the young people who will be the protagonists of a new chapter in the history of music.

A few years ago the very experience, which seemed destined to die as a passing fancy in contemporary art, is developing into an international movement involving not only areas of specialised culture, but even mass culture. In order that these experiences not be swallowed up by unscrupulous speculators and maintain intact the agreed upon intention to offer humanity knowledge of a new acoustic horizon, we must remain alert.

[8] *Excerpt from a paper on the pedagogy of teaching musical composition using electronic instruments in the conservatory\**

The course in electronic music should be required of all students in composition and be an elective for students of instrumental music.

Admission to the course should be open and at the instructor's discretion. Regretfully I have noticed that all too few conservatory students elect to study this branch of contemporary musical culture. This deficiency is attributable to the current organisation of the conservatory, which prevents the student from acquiring up-to-date cultural preparation appropriate for the fast-paced changes in the world of music today. Most valuable students come from external institutions (high school, university, polytechnic). Electronic music invites issues that involve aesthetic and compositional values of a purely musical nature, as well as technical and sociological issues. It is absolutely essential that students from different backgrounds be able to approach this area of music from the standpoint of their own preparation. For instance, students in electronic engineering could effectively contribute to suggesting and developing projects for new pieces of equipment; students in physics would add valuable insights into acoustics; those in architecture could propose new types of physical environments as performance spaces; students of literature could contribute proposals for incorporating voice into new electronic sound media through phonetic studies, etc.

After verifying their musical preparation, these students should be required to take courses in general music education. Conservatory students (according to the current curriculum) would also benefit from a short course in mathematics.

*Toward a didactic structure*

The ensemble of history, theory, and composition would serve as the foundation for the course of study. A structure of classes that is too inflexible should not be implemented to avoid the course of study's becoming a set of normative requirements

\* Pesaro, May 1973.

'set in stone'. This is too often the case in programs and examinations in other subjects imposed by the administration. The course should actively evolve and transform itself, keeping abreast of changes in technology and contemporary tastes in music. There should be an open exchange of experiences between the professor, who teaches and guides, and the student who would contribute in the field of these musical experiences through his participation and his active study. A final examination should take the form of a dissertation. As such, it would include one or more in-depth studies on any topic in the field of electronic music. For instance, the music student could submit a composition that highlights a specific use of an electronic instrument (synthesizer, sequencer, computer); the composition itself should be intended for a specific venue (concert hall, theatre, film, ballet, ambient music, etc). Students in electronic engineering would present a project involving a new instrument, or a paper on the musical applications of computers. Literature students could present a linguistic analysis of the new vocality derived from the matching of voice and electronic instruments by a given composer, or a detailed report analysing a new work by a contemporary composer.

The degree for the major should only be granted to students who already hold a degree in composition or in one instrument; a high school diploma would be the prerequisite for non-conservatory students.

The students who are not interested in obtaining the degree, but regularly attended the course for cultural or information purposes, will receive an attendance certificate. They should pass an oral examination to ascertain their degree of preparation.

Promotion from one year to the next would be at the instructor's discretion; in cases of doubt regarding the student's preparation, a colloquium with other teachers examining the student on the subjects covered during the year would be the decisive factor.

A few remarks on 'composition':

1. The first part of the course should be intensive and include experiments on the physical nature of sound (using basic sources such as sinusoidal, triangular, saw-toothed and squares waves, but excluding complex sound treatments that are not controllable), and experiments using different methods of organising sound (seriality, geometric graphics, etc.).
2. In the second part of the course, a practicum in composition using historical techniques (electronic plus concrete sounds; combinations of sounds using traditional acoustic instruments, voice, chorus, etc.) would be required, perhaps in relation to analysing significant historical works.
3. In the third phase the 'composition' would be freely chosen by the student. The instructor should be open and receptive to all proposals, without imposing any aesthetic caveats, so as to allow students every opportunity to use and develop familiarity with the technological means at his or her disposal. The instructor will suggest, based on the student's individual interests and abilities, which technical means to adopt (synthesizer or computer, live performance or recorded music.)
4. At this stage, it is important not to lose sight of the means for which the work is intended: the 'piece' should not be considered as end in itself. The final communication channels, at least theoretically, should be kept in mind (concert,

radio, television, theatre, film, advertisements, etc.). No one should assume that a school like the conservatory only turns out musical artists or performers. Its graduates are highly skilled specialists with extensive training in their discipline whose particularised skills, abilities and preparation will determine their professional choices. The training provided by the conservatory curriculum will open job possibilities for teachers of electronic music, sound technicians, composers who specialise in sound tracks for films, documentaries and advertising, musicians who specialise in music for the stage, and – why not? – musicians in the most traditional sense. From this perspective, the course in electronic music could collaborate with fine arts academies, schools of dramatic arts, dance schools, centres for independent film studies, etc.

5. Classes on recording techniques should be included in the curriculum. Attendance in this class should be mandatory for those who seek to become sound technicians for radio or broadcasting companies or the musical recording industry.

In conclusion, I would like to demystify the title “Study of Electronic Music” (which is also often referred to as the “Study of Phonology”). Many critics consider this place to be the ‘ivory tower’ of specialist or white-collar technicians. If the goal of the study of electronic musical is to utilise technology for musical purposes, it is absurd to camouflage it in a scientific laboratory. On the other hand, it is appropriate and important to link electronic music to universities and polytechnic schools for the use of computers as well as the occasional enrolment in specialised courses (computer languages, programming, etc.).

[9] *Thoughts on the synthesiser*\*

We could say that we're living through an exciting moment for electronic music: the advent of a new era marked by the appearance of synthesisers on the market and the use of computers.

It's well known that electronic music needs no musician. The composer's thought is registered on tape and reproduced exactly by the tape recorder.

The concert ritual, the subtle psychological rapport between musician and public is completely missing. This characteristic of electronic music was a benefit for the work when it first appeared. No longer filtered by the interpreter-musician and issuing directly from the composer's mind, this element was perhaps the principal cause for the decline in interest in this genre on the part of musicians. Magnetic tape often made a felicitous appearance in concert halls, superimposing itself of the orchestra or dialoguing with the instruments. But after adventures in the laboratory, many artists left off experimentation to return to the traditional instruments of live music.

With the advent of synthesisers electronic music acquired an instrument that allowed it to leave the laboratory and enter the concert hall as live performance, rather than a prefabricated product. The substantial difference between synthesisers and the computer (apart from the completely different technical conception) is that the first should be considered a real musical instrument, which has to be played in real time to produce sounds, whereas the second has to be programmed to compose and produce music.

Large and medium-sized synthesisers are built around modular blocks that allow new elements to be added, thereby enriching sounds further. The small synthesisers, the ones that interest us the most, are miniaturised to such a degree that they occupy very little space and their performance allows extraordinary manageability even if not quite up to the qualitative and quantitative level of the large ones. The appearance of the synthesiser on the world market has shaken the entire mysterious, arcane structure built up around the study of electronic music and has succeeded in making electronic sounds familiar. The versatility of this instrument has permitted electronic music not

\* Excerpt from a piece of writing dated 1972, than entirely published in *La musica elettronica al di là del laboratorio* (direction Pietro Righini), Zanibon, 1972.

only to come out of the laboratory but even to enter live into concert halls, thereby recapturing the direct rapport between musician and public that seemed impossible for electronic music of the first type. In my view the small synthesiser is destined to be very popular. However, designers should not devote their attention exclusively to popular music. This would be a serious mistake that would fatally diminish the instrument from the point of view of high-level cultural performance, since I believe it could develop its own literature. It can compete with traditional instruments in the richness of sound, flexibility in performance, and its ability to meet the expressive needs of the contemporary musician. It is obvious, however, that the 'easy' use of these instruments could be considered a danger, a superficial game, cheap acoustic hedonism. Therefore, it is important for us to monitor the instrument, to make it meet our needs, to not abandon ourselves to its acoustical charms. This is the premise we should impose on ourselves if we are committed to using it.



[10] *Towards a new acoustic experience\**

The vicissitudes of contemporary art have led many relatively uninformed people to consider the difficult search for originality at all costs by modern artists as a kind of modern malady.

With consummate foolishness they sarcastically judge the efforts of these committed artists a whim, an extravagant madness. Unfortunately, it is true that to discriminate between those who approach contemporary arts delicate problems seriously and conscientiously and the false prophets (i.e. those who mystify) breeds chaos that's difficult to work in. This shouldn't discourage us. It is useless and destructive to wallow in blissful indifference. Anyone who is sensitive and interested in artistic creation is duty-bound to follow the turbulent vicissitudes of the times we live in and participate responsibly in the emergence of artistic expression.

Our problem concerns here the future of the music world. In order to confront this we have to understand the phenomena that have led Western music to this crisis and take into account the artists who have worked to renew the language of sound.

It is well known that tonal organisation (that had found its felicitous equal temperament solution) received a fatal blow in 1865 with Wagner's *Tristan*. We can understand this as the beginning of the crisis in Western music. Chromaticism proliferated breaking tonal structure, i.e. the sounds of the tempered system flew out of the orbit of the tonal centre, throwing into question a language that had served to forge immortal masterpieces. Composers were forced to find expedients to sustain musical creativity. Some hoped to find salvation by hanging onto the past. But, like nature, the language of art can't walk backwards, nor can it stop. Some came up with polytonal, polymodal pairings or drew on folkloristic sources, sometimes creating fascinating creatures, though unable to lay the groundwork for further creative development.

Others still continued to live in the twilight of tonality without contaminating it with extraneous elements and expedients, in an effort to capture its last breath. At the beginning of our century Schoenberg realised that it was impossible to continue with

\* Published in «Marcatre» Nos. 11-12-13 (1965), p. 210-216.

traditional language and severed all links with the past, radically freeing sounds from tonal bonds.

After the wonderful expressionistic ‘chaos’ of *Pierrot Lunaire*, he gives us the free, revolutionary instrumental conception of op. 19, which represents the most advanced achievement, the most important lesson of the entire Schoenbergian experience.

The danger of musical creation’s falling into a Stygian marsh of tonality forced the ‘expressionist’ Schoenberg to reject the validity of traditional compositional techniques, since the harmonic laws of the past were now irrelevant. The complete liberation from linguistic and formal ties led the musician along a path that could seem absurd and arbitrary. But if we analyse *Six little pieces for the piano* op. 19, we can immediately see its remarkable historical importance. Its athematic nature forced the composer to give up developmental processes.

Such disorganised material couldn’t possibly generate extensive forms without falling into a monotonous and useless repetition of acoustic figurations disconnected from any rational control. The acoustic elements burn up as they appear without any chance to reproduce themselves. Sound tends to isolate itself as pure acoustic expression. Broken phrases, instantly repressed flashes, barely sketched lines rise up, colours paling into nothing, rhythms longing to regenerate themselves burning out into emptiness.

Someone called these scores: «una musica destinata al silenzio» (music destined for silence). And yet this disintegrated acoustic material, these isolated cells, defenceless but alive, represent the first step toward a new acoustic horizon. But neither language nor communication can be born of disorder. Schoenberg was aware of the need to organise the material. Using previous experience he conceived of the twelve-tone series, a new structural nucleus based on the twelve sounds of equal temperament in rapport only with themselves and developed according to the principles of the old Flemish polyphonists.

With this compositional methodology Schoenberg didn’t want to revolutionise the concept of traditional music, but to broaden its expressive boundaries by breaking from the tyranny of tonality. He aimed to translate the same expressive content of tonal music with twelve-tone technique. To save music I believe it isn’t enough to just change the technical means alone; we need to change the content, too. With tonality a mode of expression passed away. Besides a new awareness in thought was dawning – ideologies, science, and expressive impulses reflected in the arts, corresponding to a new vision of the world of modern man. We discovered that the relationship between the Self and the World had changed. Contemporary man could not incarnate in the past; he had to be the protagonist of a new experience that looks forward with a pure conscience. He was a ‘new’ primitive before whom a barely glimpsed sensory world has just opened. Evidently the time wasn’t yet ripe for Schoenberg. In fact, in his late period pieces, by now freed from theoretical problematics, the incongruencies of his language are more apparent. For this reason I am convinced that Schoenberg’s twelve-tone system represents a transitional period in the evolution of musical language.

With Webern musical language appears from a new perspective. From his first works we note a yearning for purification from the tormented and lacerated world of

expressionism toward a new vision and concept of the musical world. Maintaining a faith in rigorous, serial music discipline, he harks back to Schoenberg's op. 19 and faces the problem with lucidity. It isn't enough to liberate music from the tired laws of tonality; we need to renew the expressive content. So he begins a process of purification and spurns all commonplaces. In his 1928 *Symphony* op. 21 sound tends to be isolated, concentrating in its expressive timber; rhythm breaks from traditional formulae; acoustic images become meagre and lean. In this piece Webern pronounces himself the prophet of tomorrow's music. In his 1936 *Variations for orchestra* op. 27 silence takes on a new value till now unknown. In the *Variations for orchestra* op. 30 (1940) purification reaches its limit: the twelve-tone series is built on a single interval of two sounds, that is, the composer reduces the developmental possibilities of the whole composition to one two-note cell. One more step and he would have arrived at one isolated note incapable of reproducing itself. The musical freeing up of all past concepts by means of the process of abstraction, this is Webern's inheritance. Perhaps Webern's spiritual longing would have been to reduce music to a perfect paradox of silence, to substitute some other symbol of perfection involving the deepest, most mysterious areas of human consciousness for the physicality of sound. (By the way, this isn't a new element in the history of music if we think of Bach's *Art of the fugue* and *Musical Offering*, which were apparently intended exclusively for spiritual listening. A similar purification occurred in visual art with Mondrian's absolute painting).

With Webern we can consider that the twelve-note system has run its historical course. With Webern a musical civilisation stretching from the first babbling of the *Organa* and *Discanti* through the splendid development of the tempered system ends its historical cycle after exhausting every vital possibility to return to a magical silence.

At first sight the Webernian inheritance could look catastrophic. And yet, as we've seen, it is a necessary consequence of an historical evolution. For us musicians the waning, or rather the end, of a musical civilisation that is in our blood could make tomorrow seem hopeless. Over the centuries we've witnessed the birth and death of modality, tonality, and dodecaphony. So this means that Western man can't express himself any longer? Is his civilisation finished forever?

The moral question is one of commitment and responsibility to search and discover new horizons in the world of sound. In the rarefaction caused by the huge condensation of sounds and emotions – the culmination of a complex and tormented musical culture – today's musician, far from refusing the experience of the past, finds the route of palingenesis in the rediscovery of other dimensions of a new acoustic horizon. Science offers us an unknown universe of sounds from the infinite expressive possibilities awaiting coordination. But how can we rebuild a new logic from silence and isolated sound? How can we give meaning to these two elements, our last inheritance? Webern left us sound in its original isolation and made us realise the importance of silence.

Let's analyse these two phenomena. What is sound? We know it's a reality. What is silence? We could say it is nothingness.

Silence in music is what space is to architecture and sculpture, what the surface of a canvas is to painting. If space in architecture and sculpture is what determines form,

since form wouldn't exist without space, just as a painting couldn't come into being without a surface, so every acoustic phenomenon presupposes silence without which it wouldn't exist. Therefore silence is a reality.

From these observations we can deduce that by placing silence and sound side by side we can create a contrast that generates a vital spark.

This phenomenon awakens one of our senses, hearing, and sets our other senses in sympathetic vibration. In human beings a purely physical phenomenon is transformed into an emotive phenomenon. Depending on how silence is filled or lacerated, we can have many different reactions. If an acoustic phenomenon is emitted into the general silence, human beings experience an emotion when struck by this singular fact. Thus if we put a splash of colour on a uniformly coloured surface, this spot produces an emotional change in us. These examples bring me to the following conclusions: an acoustic event that breaks silence or a spot that covers a surface are sources of expression, because the contrast (silence-sound, surface-colour) generates an emotion charge in the human psyche.

At this point we could call 'music' an isolated sound in silence, just as long ago in 1913 Malevic called a black square on a white background a painting. This apparently paradoxical statement hides an interpretive possibility: silence or surface is a physical reality. Let's call it a positive pole. Sound or colour is a physical reality. Let's call it a negative pole. The contact between these poles produces a spark that is a source of energy that gives us an emotional charge. In my view this spark is what we should use to start the motor of a new acoustic language; i.e. I repeat, the silence + sound contrast (just as in tonal music, the motor was started by the dissonance that tended to resolve into consonance).

Modern man is already worn down and bewildered by sensations. Noise, sound, colour, images assail him from all sides and he no longer reacts to the energy that hits him. He tends to become insensitive to the miracle of sound. Think of the awe of primitive man, when he was able to produce a sound with a rudimentary instrument. That sound elicited a miraculous, mysterious, occult fascination. The instruments of primitive peoples in particular, based almost exclusively on percussion instruments or the isolated sound of a buffalo horn or the shaded notes of Chinese flutes, capture the remains of this magic.

The Asian use of disguised voice in song and the Negro use of the untamed, hoarse voice take man back to the roots of his existence. Pure sounds that seem to issue from the warmth of the earth or arrive from icy, starry space, not sounds worn out by complicated exercise. We, Europeans, have to return to this concept of sound separated from modal, tonal, or serial systems. We have to become the 'primitives' of a new sensibility. It's difficult for us to conceive of, but first let me say that isolated sound isn't semantic. It becomes so when it is brought into relation to other sounds.

Now let's tackle the tough problem. How can we organise a new discourse with the two elements available to us – silence and sound?

After the Weberian experience we witnessed the complete, serial exploitation of sound parameters. If with Webern music returned to silence and sound became isolated, we can consider the recourse to serial structures overcome. In my view the point

of departure has to be the search for the spark caused by the contact between the two elements, silence + sound. We need a unifying and systematising principle to establish limits in the unlimited universe of sound, regulate logically the various parameters, and distribute them in space according to a precise, constructive order. The lack of order could lead to the creation of chaotic musical examples owing to the sudden expansion of limits previously imposed by the equal temperament by the use of new electronic instruments. Gillo Dorfles is also in agreement that, until now, we have not yet arrived at *«sviluppare quel complesso tessuto sonoro che la musica tradizionale era riuscita a costruire e a mantenere vivo per numerosi secoli»* in the field of electronic music.

I have directed my experimentation to a higher non-musical form containing within itself the possibility of an equal application and development of acoustic parameters. I have isolated in the flat, traced geometrical form the premise for a potential new organisation of sound.

To avoid misunderstanding let me stress first that the geometrical figure, in this case, isn't absolute determinism; it's a beginning/principle. Taking my inspiration from the inheritance of Webern, I have attempted to suggest the possibility of a new acoustic organisation in the hope of introducing new dimensions to the structures of our musical world.

Comparing sounds to a geometrical figure might seem a monstrous cerebral exercise. However, let me make a comparison. The premise of a geometrical figure is no more cerebral than was the superposing of 12 fifths to create the Pythagorean musical scale or the results of a mathematical procedure based on harmonic sounds to determine harmony. Classical musical forms themselves were based on geometrical proportions; in fact, their perfection consisted in the perfection of these proportions. Even rhythm in traditional music can be reduced to a mathematical calculation. Essentially our musical culture has been built on these few elements: seven tones, two modes, three chords (tonic, dominant, and double-dominant.) But our sensibilities have achieved such a degree of familiarity that we are able to distinguish and appreciate even the slightest variations in the play of these elements.

Everything depends on conscious choice. In fact, tonal organisation, like modal and twelve-tone, are creation of the spirit, because they are moral necessities that spring from man's irresistible urge to express himself and communicate.

The evolution of humanity relates to the wonderful possibilities in man to extend his knowledge. Artistic creation is always tied to an experimental problem, which aims to express new visions of the world that man has acquired in the course of his thousands of years of experience. These visions evolve continuously and reflect the evolution of artistic creation. The artist is a person who participates in a key way in the vital problems of his time; he must be part of his time so that his art becomes a life necessity.

The stimulus that brought me to the search for new acoustic horizons was born of an inner necessity, which acts consciously after acquiring experience in the specific field of music and after a long period troubled by doubts, anxiety, reflection.

Even though musicians have been experimenting with the new instruments for more than a decade, we face a world that is still shrouded by shadow and surrounded by prejudice and general indifference. We are at the beginning of a new musical awareness.

Lack of understanding of a new musical concept is a logical fact due to our lack of training in appreciating the new discoveries in sound. If we take away melody and harmony, everything becomes illogical and monotonous. We are too used to hearing music in these horizontal and vertical relationships. Our ear should move acoustic values to another plane. The horizon has broadened. The semitone no longer represents the smallest difference in intonation. New sounds emerge and enrich the vocabulary of sound. While traditional music was organised exclusively at the volume of sound, now organisation extends to the various qualities of sound, i.e. volume, intensity, timbre. None of these parameters is primary. They all have the same importance, so a loud sound next to a weak sound takes on the expressive meaning corresponding, for example, to a pause in the traditional sense. Or the juxtaposition of two or more different timbres can substitute the expressive function of one or more traditional chords. We have to overcome enormous obstacles!

Until the listener changes his way of listening, the new acoustic discourse will always seem monotonous because he won't be able to understand it.

He will understand the discourse more easily if he understands the geometric figure. In traditional music comprehension, and thereby the logic of the language, was entrusted to the potential possibilities of developing various thematic elements, which always happened, however, within the preordained order of the tonal system...

## [ I I ] *Explanation of the geometric figure\**

### 1) *Frequency fields*

I started from an elementary figure, the equilateral triangle.

Each side represents a frequency field made up of 18 sounds. On the right side, which I'll call no. 1, the sounds cover a range of from 1500 to 2350 Hz, in progressions of 50 (1500, 1550, 1600, etc.) The left side – no. 3 – comprises frequencies at between 300 and 470 Hz, in progressions of 10 (300, 310, 320, etc. The bottom side – no. 2 – comprises frequencies at 120 to 188 Hz, in progressions of 4. In this way, I chose three different frequency fields that permit me to take advantage of three different timbre possibilities.

### 2) *Intensity*

Each side is further divided into three sections, each of which corresponds to an intensity: *piano*, *mezzo forte*, *forte*.

### 3) *Development schema*

In the table to the side, I show my development schema, in which I've coordinated the various sound parameters: pitch, intensity, and timbre in order to achieve the maximum variety with the maximum economy of means, according to Schoenberg's principle.

### 4) *Examples*

Let's look at an example to see how the figure develops.

In the legend I find the first sound in Section I, series A, side no.1, corresponding to 2350 Hz, intensity mF. Here it is (recorder A). Then from Section I, series A, side no. 2, corresponding to a sound at 120 Hz, intensity F (rec. B) and then the third side, Section I, series A with a sound at 300 Hz, intensity P (rec. C).

\* Continued from the conversation *Toward a new sound experience*, in «Marcatre», Nos. 11-12-13 (1965), p. 210-216.

In this way we have traced the outlines of the figure. The sounds that follow will fall within these limits.

Let's continue with another example: after having shown the first three sounds of the figure, which you just heard, we'll move to other three sounds. We choose series B, also from Section I, after series A. The first sound of this series refers to side no. 2, corresponding to 120 Hz, intensity F (rec. D), followed by side no. 3 with a sound at 420 Hz, intensity F (rec. E), then side no. 1 with a sound at 1750 Hz, intensity mF (rec. F). Thus, with these other three sounds we have traced another triangle inside the ordinary figure, which we can consider complete when the 54 sounds that make it up are used up, 18 for each side. In this way, we will trace 18 internal triangles, corresponding to the 18 series traced in the development schema.

### 5) *Rhythm*

Rhythm, i.e. the length of individual sounds, derives from the figure itself. It can be traced on graph paper, which gives a number of horizontal regular spaces (or squares) that can be controlled. The length of each sound corresponds to the number of horizontal spaces that separate it from the next sound. By giving each of these spaces a temporal value, for example, an eighth of a second, we obtain unique rhythmic figures that derive from the figure itself. For example, by inserting the six sounds you just heard in their rhythmic space, we will get the following results (recorder example G).

### 6) *Processing of sound*

However, these sound examples have no expression. Pieces conceived in this way would be monotonous to the point of exasperation.

The sounds I've used in the sound experiment you are about to hear come from a sinusoidal sound generator. By sinusoidal sound we mean a pure sound, without or almost completely without harmonics, i.e. without any timbre character.

Listen to it (recorder example H). This is at a frequency at 400 Hz, corresponding to A on the tuning fork. What expressive possibilities does a sinusoidal sound have? How can we *animate* it, give it life?

- A sound can be born of silence (rec. ex. I);
- or die in silence (rec. ex. L);
- or vibrato can be added (rec.ex. M);
- and the vibrato can be increased (rec. ex. N);
- or decreased (rec.ex. O);
- or it can seem *staccato* (rec.ex. P).

So the simple frequency at 400 Hz takes on character and expression.

By superimposing other frequencies of varying intensity on a pure, sinusoidal sound, we can obtain beats or even new timbres. In this way we enter a world of infinite combinations.

Here is our frequency at 400 Hz on which we have superimposed another sound (rec. ex. Q);

- two more sounds (rec. ex. R);
- three more sounds (rec. ex. S).



This combined sound, now with completely different character from the original sound, can be made more expressive by applying the above characteristics.

In this way, by using just one sound generator, I have elaborated the sound experiment you are about to hear. In the first structure I use the pure sinusoidal sound, that in the three structures that follow is enriched by one, two, three other superimposed frequencies. I chose the sounds I add to the base sound from the geometric figure and likewise all the characteristics to give the sound expression.

### 7) *Development of the composition*

Now let's talk about how to develop the possibilities of this triangle.

This is the Ordinary figure. If we turn it upside down, we get the Reverse figure. If we proceed backwards we get the Ordinary Retrograde and Reverse Retrograde figures. This way I get four shapes deriving from the polyphonic and twelve-tone traditions, in which the various sound parameters, including rhythm, will develop in a new order, never repeated.

The first structure of the piece you'll hear is represented by the Ordinary figure in its totality.

In the second structure you'll hear the overlapping of two shapes, the second obtained by diminution.

In the third there are four overlaps, one by enlargement, one normal, one by diminution and one by double diminution.

In the fourth structure there are two overlaps again. Starting from a clear environment of distinct sinusoidal sounds, surrounded by silences that I would dare to call magical, the sound texture gradually becomes enriched by new sounds, new timbres, new effects, to then return by degrees to the rarefied atmosphere of the beginning and disappear into silence.

The experiment was carried out in stereo with four independent sound sources, which have to project the geometric shape that generates the entire sound structure into space.

### 8) *Enlargement of the geometric figure in various expressive forms*

This is the principle by which I've suggested a new way to organize sounds. If I want to compose another piece, I trace a new figure, a circle, a square, or another triangle, etc., in total freedom.

It's up to the composer to select each time the possible developments in the figure s/he has chosen using the frequencies, intensities, and timbres s/he wants.

I think the organisation inherent in geometric figures can be applied not just in music, but also in other fields of expression.

In order to prove to myself the myriad developmental possibilities of a given figure, I did these visual experiments in which, by using construction principles analogous to those inherent in the triangle shown here, I got completely different figures.

I think it will be possible to develop a wide range of possible elaborations of the same figure in the musical field by varying the application of these construction procedures.

[12] *Il quadro del 2000 (Painting 2000)\**

I have been experimenting with the correlation between sound and image since 1964.

In 1964, after having contributed to music as a composer, I turned to the new currents, which saw in electronic music an outlet for the imagination after the twelve-tone adventure.

I founded the SMET, Studio di Musica Elettronica di Torino. In 1966 I started an experimental course in electronic music, which was added in 1968 to the curriculum at the Conservatory of Turin, the second course in Italy after the one in Florence. Along with other aesthetic operators, I founded in the same year the “Studio di Informazione Estetica” operating along structuralist lines with a particular interest in interdisciplinary issues in different artistic disciplines.

My approach to the devices used to generate and elaborate sound electronically presents me with the dilemma of how to organise a new acoustic universe torn from tradition without being tempted to proceed by entrusting the composition of the work to sheer emotivity.

I pinpoint an organisational schema with acoustic parameters based on a graphic image representing a flat geometrical figure from which I can monitor the overall compositional process by means of a series of readings within the figure itself and by using combinatorial procedures.

I sense, too, that the base project can also be used to organise visual works. In this way, I begin an interdisciplinary process between sound as visual elements with experiences, which then in the 60s were consolidated in Plexiglas objects, reflecting structures, and metal sculptures. However, a substantial difference remains: while the acoustic object is articulated in time by its very nature, the visual object is logically static.

After the structuralist experience, I devoted myself to freer creativity with the advent of the synthesiser (the beginning of the 70s) by performing electronic music live in concert halls, i.e. no longer circumscribed by the walls of a recording studio.

\* Report in “Art & Computer”, Centro Nazionale di Drammaturgia, Rome, November 2001.

This is how short works, so-called 'ricreazioni da camera' (chamber recreations) were born, a kind of total theatre with music, recitation, image projections and films (see *Il giuoco dell'oca* from the novel by Edoardo Sanguineti and *Raptus* from a text by Maurizio Châtel). While making the films, I began to feel the need to create painting in movement linked to music. But techniques at the time didn't allow me to develop this experience.

In the 80s the video camera appeared. I could transfer the musical experiments I intended to perform live to the television screen. This was the first step towards a conjunction, created by analogy, between sound and image. These works could be included in the current called 'Video Arte' (Video Art).

My desire to create painting that articulates itself in time together with music in a structurally analogous relationship is still latent and not realizable.

I made some progress at the beginning of the 90s using a camera with a 'macro' lens.

The real images, at times elaborated electronically, appear on the screen as almost abstract images, at times difficult to distinguish from the original form.

This process led me to the 'concrete music' technique that Pierre Schaeffer, leader of the "Groupe de Recherches de Musique Concrète" on French radio, used in the 50s. This technique involved capturing a live acoustic event on the tape-recorder, then elaborating and transforming it by electronic means on laboratory instruments. Similarly I do the same thing with images recorded with the video camera and then manipulated electronically.

In this way I've come to delineate the possibility of realising what I define as 'Video Pittura' (Video Painting); i.e. an event that we could call pictorial and no longer static, but in transformation in time. The relationship to music remains causal nonetheless, since we are dealing with a purely emotive juxtaposition.

The difficulty doesn't lay in making the image coincide at a given point in the sound track (for the sake of understanding, let's call this acoustic-image synchronisation), but coupling with each image a pre-established sound whose length, intensity, elaboration relates to the image itself.

In the second half of the 90s the computer made it possible for me to arrive finally at the solution to the problem. In fact, my working situation became analogous to that of the early years of electronic music when sound was created and elaborated in a studio.

Similarly I didn't capture the live image with the video camera, rather I created it by myself directly on the computer.

After over thirty years I found myself taking up the geometrical base schema of the 60s to organise experimentation with a kind of work I came to define as 'il quadro del 2000', 'the painting of the year 2000'.

From the base schema I derive the course of visual and acoustic images, their temporal order, length, intensity; i.e. those elements that allow me to produce a non-static product, not casual, but controlled, retraceable, thus verifiable.

This product, which I call 'progetto' ('project'), usually lasts about two minutes in current experiments and can be read in various ways; i.e. beyond the normal reading, from the end, (backwards), or in mirror image.

I have experienced that by superimposing two or more projects I obtain combinations of images that interfere with each other, thereby fundamentally modifying the overall vision. I had an intuition of this process by referring to music, more precisely to polyphonic technique in which two or more voices superimpose creating horizontally, a complex weave of sound in continual transformation, while at the same time determining vertically encounters between sounds, called 'chords', which create harmony. In the superimposition of images in motion, I isolated the visual co-respective of polyphony, which we could call 'polymorph' or 'polygraph' or some other appropriate term. By connecting the various 'projects' one after the other I can create works of varied length, even of several hours.

This way of working could appear completely deterministic. In reality creative and random components are present in equal measure:

1. the project, i.e. the organisation of the material, is the work of the author;
2. all of the material, images and sounds, are created and elaborated (animation and filters) by the author;
3. the superimposition of images and sounds is totally random.

So this is how I arrived at a definition of 'painting 2000':

The painting of the new millennium is live painting, in motion and in continuous transformation. It develops in time like music to which it is intimately related.

*The possibility to superimpose images which in their dynamism create a 'polymorph' similar to 'polyphony', the superimposition of two or more voices is another element analogous with music.*

*Traditional painting, which is characterised by a static vision, is substituted in this case by a plasma monitor where forms, colours, and sounds evolve continuous temporal space, revolutionising decisively the fruition of the work. Just as polyphonic music generated new possibilities for the accumulation of sounds with the fusion of different properties of the acoustic parameters, so in this painting the contemporaneous nature of forms and different colours in the act of becoming produce a new, more varied and more complex vision.*

Ciriè, 7/14, 2001

### [13] *Reflections on the use of computers*

*Computer Art* is different from *Video Art* for the following reason:

In *Video Art* images are filmed with the video camera or rather they are pre-existing images that are then elaborated on the computer. In *Computer Art* images and sounds are created directly on the computer and are always elaborated on the computer. Frequently works that contain 'real' images, i.e., images captured by a video camera, and 'synthetic' images generated by computer are called *Computer Art*. The phenomenon is similar to the evolution of electro-acoustical music. Originally the term «electronic music» referred to works created exclusively in a laboratory, i.e. acoustic material was created and elaborated entirely in the studio. The term «concrete music» referred to the creation of works using natural, recorded sounds captured on tape and then elaborated electronically in the studio. Later any work created with electronic instruments came to be classified as «electronic music».

To my thinking *Computer Art* aims to promote a new aesthetic sensibility intimately connected to our times. It deals with images that originate in the deepest spheres of our imagination and that the new medium urges us to explore and make real. A new, essentially dreamlike vision is revealed before our eyes. A vision that has nothing to do with the images of the nature that surrounds us, but that in some way tends to reunite us to it.

Trana, 1997

I've been working with electronic musical instruments for more than thirty years. My curiosity didn't develop exclusively in the direction of new music pieces, but also toward re-editing of pieces from the past with the use of the instruments technology offered me.

In this case, my attention turned to piano music since I had trained in piano. I want to make clear that my interest in interpreting classical music with digital electronic instruments is not intended as a challenge to the glorious instrumental tradition nor to the worthy pianists whose interpretations I consider inimitable. Mine is a personal challenge I have taken on with the electronic medium in the hope of master-

ing it, liberating it from the mechanistic coldness typical of the medium. I had worked about ten years before I first succeeded in dominating the instrument, in making it manageable for my aims. I haven't always succeeded in achieving what I wanted, but in general, I'm fairly satisfied, especially with certain pieces. Certainly the quality of touch and refinements of phrasing achieved by the great pianists cannot be equalled. But if there are limits, in exchange there are qualities that we cannot always capture in many interpretations, even the best ones. These are the absolute precision in the execution of the musical score, in the clarity of the various voices and difficult passages, in the overcoming of every technical difficulty. And that isn't a small thing.

1997

In order to take on the issue of creating images on the computer, I developed a work plan that permitted me to sound out the possibilities of the medium and forced me to take best advantage of the peculiarities of the instrument.

My intention was to demonstrate that with the computer we can realise not only images common to a certain geometric rigidity, but also those containing an enormous formal variety and infinite pictorial nuances.

I established the following method:

- depart from a relatively simple geometric icon, what I call 'theme';
- proceed using only the program *filters* of an application program (ex. Photoshop);

In this way, by referring to the variables in the base figure, the 'theme', I can develop the images I call 'variations', by selecting the proper filters. The possibilities are infinite. The selection of the filters and the corresponding parameters is purely personal. Through various successive stages, I arrive at what I believe is the final state, an image (variation number x) whose genesis derives from the base 'theme'.

In this way, I have managed to obtain a number of variations deriving from one theme, each able to take on a life of its own.

By annotating all of the relevant data concerning the various stages of development of the image, I can recreate *ex novo* the same images from the 'theme' (except for some which contain causal variables). In this way, I can eventually verify work completed.

Trana, 1998

[On pp. 179-181 the drawings of three compositional projects are presented]