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Three components of Xenakis's universe

Makis Solomos

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Abstract

This article offers a general view of Xenakis's musical world, focusing on three of its main characteristics:

1. Global approach. Starting from the notion of “mass”, thanks to which Xenakis distanced himself radically from serialism in the early 1950s, it analyzes several aspects of this approach: composition with the help of graphs, idea of sound “clouds”, notion of space, technique of gradual transformation (process). Then, it defines the global approach as composition-of-sound.

2. The theory-practice relationship. The article analyzes the polysemy of the notion of “formalization”, which Xenakis used thoroughly in his theoretical writings. Indeed, for him, formalization means “art/science alloys”, but also axiomatization or even the simple use of mathematics to compose music. Then, the article examines the relationship between theory and practice, explaining that, in fact, only a few of Xenakis's works were actually composed with the help of theories, that there are always gaps between theory and practice, and that Xenakis very often reused as raw sound material musical extracts that were once composed with the help of a theory.

3. With the last component, the article analyzes a strong characteristic of Xenakis's music for the listener: its immediate effect. This is a result of Xenakis aesthetics, i.e. its Dionysian and gestural character.

Since Xenakis joined the pantheon of those few creators who forged the face of post-war avant-garde music, the musicology devoted to him has assigned itself the task of giving prominence the extraordinary diversity of his activity. However, the analysts, historians and estheticians who carry out these specialized studies (see Solomos 2013) are in agreement in considering that the heterogeneity of their investigations does not call into question the unity of the Xenakian universe. But it can no longer be stated on the basis of a single narrative, in the manner, for example, of the particular epic presented by *Musiques formelles* (Xenakis 1963) and, above all, the revised edition of *Formalized Music* (Xenakis 1992): there are indeed *several* different components of which the juxtaposition or convergence produce this unity.

In the following, I have chosen to favor three of the most important components, to which a certain number of others can sometimes be related. The first is characterized by a global approach; at an immediate level, it can be presented as a global approach to the sound phenomenon and, at a more abstract level, as the method implemented in several aspects of the compositional activity. The second stems from the particular constructivism that Xenakis deployed around the delicate question raised by the idea of “formalization” of music, and

raises the issue of the relationship between “theory” and “practice”. As for the third, it defines a level of Xenakis's music that accounts for its quasi-immediate effect.

1. A GLOBAL APPROACH TO SOUND

1.1. The global approach

Xenakis's whole approach is characterized by its global nature. This type of approach is particularly flagrant in its conception of musical texture. Thus, within the musical avant-garde of the early 1950s, characterized by a parametric decomposition of the sound phenomenon, he introduced a global approach to it. This approach is laid out in his historic article “La crise de la musique sérielle” (Xenakis 1955) in which, referring to the serial music of the period, he writes this oft-quoted paragraph:

“Linear polyphony destroys itself by its very complexity; what one hears is in reality nothing but a mass of notes in various registers. The enormous complexity prevents the audience from following the intertwining of the lines and has as its macroscopic effect an irrational and fortuitous dispersion of sound over the whole extent of the sonic spectrum. There is consequently a contradiction between the polyphonic linear system and the heard result, which is surface or mass” (Xenakis 1955, 3)

This conception partially places Xenakis in the Varésian legacy. With Varèse, we already find criticism of “linear polyphony [counterpoint]”—an expression that doubtless goes back to Ernst Kurth—as well as the idea of music conceived in terms of “masses” (see Varèse 1983, 91). However, with him, the notion of mass is perhaps less important than the idea of “volume” and “projection of planes” (see *ibid.*). Here, the criticism of “linear polyphony” is above all criticism of linearity: Varèse dreams of a new type of polyphony, superimposing volumes instead of lines, conceived in geometric terms. On the other hand, with Xenakis, it is polyphony itself which is entirely called into question: musical texture is henceforth conceived as a total integration of the sounds that make it up, hence the importance of the word “mass”. Of course, this did not prevent Xenakis from taking up with polyphony again as the superposition of masses, but the term “polyphony” is then inappropriate, and it is better to simply speak of “superposition”.

1.2. The various aspects of the global approach

From *Anastenaria* (*Procession aux eaux claires*, mixed chorus, male chorus and orchestra, 1953 and *Le Sacrifice*, orchestra, 1953) to *0-Mega* (1997, percussion and instrumental ensemble), his last work, Xenakis applied this global approach to the sound phenomenon in manifold ways. I would like to illustrate this extraordinary variety by taking a few analytical examples, chosen in such a way that several questions linked to this approach arise. These examples, which will be treated in chronological order so that the reader might also have a general idea of Xenakis's evolution, concern *Metastaseis* (1953-54, orchestra), *Pithoprakta* (1955-56, string orchestra, trombones and percussion), *Terretektorh* (1965-66, orchestra), *Nuits* (1967-68, vocal ensemble) and *Jonchaies* (1977, orchestra).

The beginning and ending of *Metastaseis* allow for explaining the notion of mass in relationship with one of Xenakis's favorite work methods as well as one of his characteristic sonorities. The compositional method in question explains how the global approach ensues from the apprehension of (geometric) space as an operative tool and can also be apprehended as morphodynamic research (see Iliescu, 2000): it is the design on graph paper. At the time, Xenakis was practicing his profession as civil engineer and architect with Le Corbusier. It may thus seem natural that he think of conceiving music with such designs. The transposition of this tool into the musical sphere goes hand in hand with the birth of the global conception of the sound phenomenon. But we must be careful: contrary to what one might think, composing with such graphs does not mean neglecting detail—the precision of graph paper attests to this. As concerns the characteristic sonority to which this original method gave birth, it is equally original: it is a matter of massive *glissandi*, which are presented quite simply as a set of straight lines on the graph. **Figure 1** provides Xenakis's graph for the first version of the final measures of *Metastaseis*. It will be noted in passing that, to obtain these massive *glissandi*, Xenakis innovates radically in the approach to the orchestra: the strings are totally individuated.

Figure 1: *Metastaseis*, bars 317-333: Xenakis' graph for the first version. Source: Xenakis 1971, 8

Second example: bars 52-59 of *Pithoprakta*. They achieve a second type of sonority, equally innovative and characteristic of Xenakis: the famous “clouds” of sounds. The Xenakian expression of “cloud” infers that the sounds are of short duration; here they are *pizzicati* (followed by *glissandi*). Moreover, this expression implies the existence of a very large number of sounds: more than 1,000, played in only 8 bars by the 46 lines of strings (**figure 2** gives the graph with which Xenakis has distributed these values)¹. This double conjunction—a mass of brief sounds—will lead Xenakis to develop a granular conception of sound at the end of the 1950s). Third and last factor of the expression “cloud”: if one conceives of a cloud not as a “fog” or “mist”—here I am thinking of the “mists” of Impressionist music—but as a “gas”, the door opens to one of Xenakis's other major innovations, the “parabola of gases” (Xenakis 1958, 18). The metaphor is highly poetic but, in keeping with the type of poetry that Varèse also appreciated, poles apart from the Romantic poetry of human passions (see Varèse 1983, 41). Knowing that a gas is made up of molecules, Xenakis would say: “Let us identify the sporadic sounds, for example: pizz., with molecules; we obtain a homomorphic transformation from the physical sphere to the sphere of sound. The individual movement of sounds does not count” (Xenakis 1958, 19). Starting from there, the way of probabilistic calculation and what Xenakis would call “stochastic music” is open, for it has been known since the mid-19th century that molecules have a random behavior.

Figure 2: *Pithoprakta*, bars 52-59: Xenakis's graph. Source: Xenakis 1963, 31

In the 1960s, the global approach, which presupposes the fusion of the traditional dimensions of music (pitch, rhythm, intensity) in view of the composition of a sonority, adds

a new dimension: space. Space had already been exploited by Xenakis in the “routes of sound” of the Philips Pavilion at the Brussels World's Fair and in *Concret PH* (1958, tape) as an “additional” dimension. At the time of *Terretektorh*, he proposed another conception of it, which could be called “the sound-space” (see Solomos 2013b). In this piece, the 88 musicians of the orchestra are scattered *throughout* the audience, according to the diagram in **figure 3**. Spatial movement is calculated using various types of formulas (Archimedean, hyperbolic and logarithmic spirals: see Santana 2001). Thanks to spatialization, Xenakis tells us, “ataxic or ordered movements of the sound masses rolling against one another, by waves, etc., will be possible. *Terretektorh* is thus a ‘sonotron’: a sonic particle accelerator, a disintegrator of sound masses, a synthesizer. He puts sound and music around man, quite close to him, ripping the psychological and auditory curtain separating the listener from the musicians placed far away on a stage-pedestal, itself placed in a box most of the time. The orchestral musician thus regains his responsibility as an artist and individual” (Xenakis 1969). Spatialization does not constitute an additional dimension but totally merges with the sound textures, themselves conceived according to a global approach. Here, the holistic conception attains one of its acmes, which will be surpassed only by the Xenakian “polytopes” (see Xenakis 2008, 198-278).

Figure 3: *Terretektorh*: the orchestral arrangement. © Salabert Editions

Nuits allows for illustrating another important characteristic of the Xenakian approach to sound totality: the process technique. The first large part of the work (bars 1-131), even though made up of a multitude of sections and subsections, seems to be of a single piece: it consists of several progressive transformations. Let us examine the process in bars 88-119, which is made up of a continuous double evolution: of register, with the 12 voices progressively spreading over the whole register; and of sound state, with the repeated sounds on phonemes dominated by the consonants, which are gradually replaced by *tenuti* on vowels (**figure 4** provides a passage central to this process). This analysis shows another aspect of the global approach when it adds the process technique: the fusion of form and material. In traditional music, form is conceived as development of a specific material (theme, cell, etc.). Here, it consists of a progressive deployment of the material—in this sense, Xenakis is indeed one of the ancestors of French spectral music (Gérard Grisey, Tristan Murail, et al.: see Solomos 2003).

Figure 4: *Nuits*, bars 92-95. © Salabert Editions

In the 1970s, Xenakis developed other techniques generating global sonorities: “Brownian motions” (*Mikka*, solo violin, 1971) and “arborescences” (*Erikhthon*, piano and orchestra, 1974). Then he focused on “sieve theory” (dating from the 1960s), which allows for inventing all sorts of scales. The beginning of *Jonchaies* (bars 10-62) is constructed entirely on a single, non-octaviating sieve (**figure 5**), of which the register totals a bit less than five octaves and which, according to Xenakis (*in* Varga 1996, 162), evokes the *pelog* scale. But the sieve is not used to create “melodies” or for its intervallic relations. As shown in **figure 6**,

which excerpts one of the lines from bars 26-29, Xenakis descends or ascends this scale in linear fashion, along sinuous paths (in this passage, this line reaches the lowest note of the sieve then begins to rise) and according to a gigantic heterophony made up of numerous superimposed lines. In sum, the scale is apprehended globally, and this passage can be perceived as a single sound that unfolds progressively and of which we explore, as under a microscope and with a slow-motion effect, the internal composition as well as the temporal evolution (see the overall design proposed by Harley 2004).

Figure 5: *Jonchaies*, bars 10-62: sieve.

Fig. 6: *Jonchaies*, bars 26-29: vl.I.3, vl.I.4, va9, vc1. © Salabert Editions

1.3. The global approach as composition of the sound

To conclude on this first component of the Xenakian universe, I would like to point out that it can be interpreted according to a perspective that changes our view of things. In the previous analyses, I referred to the idea that one section of a work by Xenakis is presented as a single sound that unfolds progressively. Elsewhere, I have spoken of “sonority”. This goes to show that the global approach which this is about, constitutes not only a compositional method but is indeed, as I have indicated, a global approach to the “sound phenomenon”, an expression that can be taken literally. Knowing that this global approach, as the analyses have suggested, goes through a strongly constructivist method, it can be said that, in Xenakis there already occurs what Jean-Claude Risset (1971) said concerning the additive synthesis: the composition *of* sound is substituted for composition *with* sounds. The sections with massive *glissandi* of *Metastaseis*, bars 52-59 of *Pithoprakta*, the first large part of *Jonchaies*, etc. can be perceived and analyzed as composed sounds. Since it would be irrelevant to develop this question in the present article, I refer the reader to other articles: Solomos 1993, 2004 and 2013.

2. THEORY AND PRACTICE

A second, very important characteristic in Xenakis is the particular relationship he wove between theory and practice. We know that post-war avant-garde music pushed theoretical reflection and the elaboration of “systems” to the limit. Xenakis went very far in this direction, owing in particular to the fact that he convoked the sciences. At the same time, doubtless due to this excess of theorization, practice, for him, tended to become independent of theory, or even enter into contradiction with it.

2.1. “Formalization”

On the theoretical level—in the strong sense of the term: which corresponds to a *theoria*, a vision, a way of seeing things—, Xenakis produced a very fascinating thesis: the “arts/sciences alloys” (Xenakis 1979). This expression is certainly the most beautiful he ever used regarding his borrowings from the sphere of sciences: art-science, if it were to occur someday, would be an “alloy”—which, moreover, is plural (“alloys”)—and not a perfect synthesis or merging, etc. In particular, this thesis postulates that: “Nothing prevents us from foreseeing a new relationship between the arts and sciences, especially between the arts and mathematics; where the arts would consciously ‘set’ problems which mathematics would then be obliged to solve through the invention of new theories” (Xenakis 1985, 3).

Given the balance of power between art and science, to achieve his “alloys”, Xenakis could only invert the approach (see Charles 1968, 23): he transferred mathematical reasoning (already existent) into the sphere of music. In the early 1960s, strongly influenced by the debate in mathematics at that time, he conceived this transfer as an attempt at “formalizing” music: it is the title of his most famous book, *Formalized Music*. This expression really caught on, and there is sometimes a tendency to identify it with the entire Xenakian undertaking. It is not difficult to explain the success met by the idea of a “music formalization”, if we just think that the utilization of new technologies (the computer) leads quite naturally to looking for formalizable representations of all that was traditionally codified in implicit ways. However, in Xenakis’s writings, it is not at all a homogenous notion, as Xenakis used it with at least three meanings.

Formalized Music refers to “formalization” in its title, but in the book we find it very rarely. We find it in the Introduction and the Conclusion to the book:

“This abstraction and formalization has found, as have so many other sciences, an unexpected and, I think, fertile support in certain areas of mathematics. It is not so much the inevitable use of mathematics that characterizes the attitude of these experiments, as the overriding need to consider sound and music as a vast potential reservoir in which a knowledge of the laws of thought and the structured creations of thought may find a completely new medium of materialization, i.e., of communication” (Xenakis 1992, IX).

“Formalization and axiomatization constitute a procedural guide, better suited to modern thought. They permit, at the outset, the placing of sonic art on a more universal plane. Once more it can be considered on the same level as the stars, the numbers, and the riches of the human brain, as it was in the great periods of the ancient civilizations” (Xenakis 1992, 178).

From these lines, it seems that the meaning of “formalization” is quite broad, and could even be the same as “abstraction”. However, *Formalized Music* especially focuses on practical implementations, so it is not surprising to see that the issue of “formalization” is not further developed in conjunction with “abstraction”. In the 1960s, Xenakis preferred the term “axiomatization”, in the sense of mathematical axiomatics (see, for instance, Xenakis 1966). Both terms almost completely disappeared from his writings after the 1970s. I would say that Xenakis rarely used the word “formalization” because its general principle, as already observed, is (mathematical) axiomatization; and while mathematical axiomatization certainly stimulated his imagination, we should admit that he was pragmatic enough to feel that this was not a particularly fertile path for practical developments in music – the only exception is *Nomos alpha* and his article about it (Xenakis 1966).

On the other hand, there's another term found in *Formalized Music*, which may shed some light on a second meaning of formalization: "mechanism". Xenakis used it in his earlier writings and continued to use it in later years. Here is an "invariable" in his writings. Even if the term "mechanism" is rarely used in *Formalized Music* it is important because it refers to the practical issues of formalization. While the general idea of "formalization" as synonymous with mathematical axiomatization may not have *practical* aspects, the idea itself of "formalization" *has* a practical goal. In the book, Xenakis used the word "mechanism" when dealing with stochastic composition with computers:

"[...] everything that is rule or repeated constraint is part of the mental machine. A little 'imaginary machine', Philippet would have said—a choice, a set of decisions. A musical work can be analyzed as a multitude of mental machines. A melodic theme in a symphony is a mold, a mental machine, in the same way as its structure is. These mental machines are something very restrictive and deterministic, and sometimes very vague and indecisive. In the last few years we have seen that this idea of mechanism is really a very general one. It flows through every area of human knowledge and action, from strict logic to artistic manifestations. Just as the wheel was once one of the greatest products of human intelligence, a mechanism which allowed one to travel farther and faster with more luggage, so is the computer, which today allows the transformation of man's ideas" (Xenakis 1992, 132).

If we refer the notion of "mechanism" to the initial words comprised in this quotation, "rule" and "constraint", we finally get to that which can be seen as a practical goal of Xenakis's formalization efforts: the construction of a kind of "black box", so to say, which may be in itself able to produce a whole composition only based on some input data. It's with this notion in mind that we can understand Xenakis's extraordinary research into the "fundamental phases of a musical work", and his search for a "minimum of constraints" in the composition of *Achorripsis* (Xenakis 1992, 22-24). To be able to define the smallest possible set of constraints would mean to be able to explain the rules of composition, i.e. to design and build a mechanism able to compose a musical work. The ST computer program (early 1960s) and the GENDYN program (early 1990s) are such mechanisms. Describing the latter, Xenakis in the 1990s used almost the same words he had used 30 years earlier to describe the composition of *Achorripsis*: "[...] the challenge is to create music, starting, in so far it is possible, from a minimum number of premises but which would be 'interesting' from a contemporary aesthetical sensitivity, without borrowing or getting trapped in known paths" (Xenakis 1992, 295).

The third and last meaning of formalization is simply the use of mathematics. It is as such that we may speak of "Xenakian theories". Contrary to what might be thought, the list is short, and some of them have been mentioned previously. Here is this list, in chronological order: 1. "Stochastic music" (use of probabilities for macrocomposition, i.e., applied to instrumental composition: "free stochastic", "Markovian stochastic", ST program); 2. "Musical strategy" (use of game theory); 3. "Symbolic Music" (use of symbolic logic); 4. "Group theory"; 5. "Sieves"; 6. "Dynamic Stochastic (sound) Synthesis. To this list let us add "theories" that are not very precise or which Xenakis scarcely explained: 7. "Arborescences"; 8. "Brownian motion"; 9. "Cellular automata"ⁱⁱ. Finally, a technological invention could be included here: 10. UPIC.

2.2. Theory and practice

From the preceding, the reader will have understood that the “theorization” that Xenakis practices is far from being a homogeneous undertaking. At present, we should insist on the existence of a certain number of factors that lead to relativizing the undertaking of theorization—in any case, the role of formalization—in his music and which reveal a largely autonomous *practice* that is equally, if not more, important than theory.

First of all, analysis of Xenakis's works shows that, in fact, very few works were really composed using “theories”. An extreme case: “symbolic logic”, to which an entire chapter of *Formalized Music* is devoted, served only for *Herma* (1961, piano) and certain passages in *Eonta* (1963-64, piano and brass quintet). This “theory” quickly gave way to “group theory”, which is derived from it, in an even more formalizing aim. The latter, too, was used but rarely: it was above all in four works from the 1960s—*Akrata* (1964-65, wind ensemble), *Nomos alpha*, *Nomos gamma* (1967-68, orchestra) and possibly *Anaktoria* (1969, instrumental octet) (see Schaub 2005, Andreatta 1997/1998)—that Xenakis produced original calculations based on this theory. We have seen that dynamic stochastic synthesis (GENDYN program) was used exhaustively for only two pieces (see Hoffmann 2009), but let us note that *La Légende d'Eer* (1977, tape) includes sounds synthesized with this method. Game theory was used for three works: *Duel* (1959, two orchestras), *Stratégie* (1962, two orchestras) and *Linaia-Agon* (1972) (see Schmidt 1995, Sluchin 2005). Cellular automata are present in certain passages of *Horos* and a few other pieces from the 1980s (see Solomos 2005). With UPIC, Xenakis composed only *Mycènes alpha* (1978), the electronic parts of *Pour la Paix* (1981), *Taurhiphanie* (1987) and *Voyage absolu des Unari vers Andromède* (1989). Markovian stochastic served primarily for *Analogique* and *Syrmos* (1959, string ensemble). Thus, there remains, as “theory” used more extensively, free stochastic, sieves, Brownian motion and arborescences. If we take into account the fact that the latter two are presented straight away as graphic methods and that the word “theory” seems incongruous in connection with them, that leaves only the first two.

This goes to show that, if limited to “theories”, i.e., to compositional techniques that he himself explained, analysis of Xenakis's works quickly turns into an impasse. It must absolutely take into account the other compositional methods, in particular the graphs to which Xenakis often resorted, at least until the late 1970s. In addition, it is very important to note that, even in the works where a “theory” is practiced, it is far from governing everything—with the exception of the pieces coming from the *ST* and *GENDYN* programs, which, as has been said, stem from the quest for complete automation. The case of *Nomos alpha* is revealing, being Xenakis's most ambitious piece from the point of view of formalization. However, analysis (see Solomos 1993, 1997) shows that entire sections of the piece were not calculated. Another, even more revealing, example: the sieves. As was said regarding *Jonchaies*, in the late 1970s, Xenakis limited them to pitches. Also, although almost all the pieces from the late 1970s up until the early 1990s seem to use sieves, we find ourselves in a traditional situation: sieves are used to produce pitches (and sometimes rhythms), but the rest is composed intuitively, “by hand”.

Another factor: speaking about group theory, I indicated that, in the 1960s, only four works produce “original” calculations based on this theory. In fact, as shown by Benoît Gibson (2011), Xenakis tends to take up material from one piece calculated on a “theory” to “recycle” it in another piece. This practice had largely escaped notice by analysts for, during implementation, Xenakis applies processes for transforming the recycled material, most often to the point of rendering it unrecognizable. For example—an example chosen to account, one last time, for the practice of “transfer” peculiar to Xenakis—, certain sieves of pitches calculated for *Nomos alpha* become, in *Persephassa* (1969, six percussionists), sieves of durations.

A very important consequence ensues from all these remarks: only a small part of Xenakis's output stems from formalization. The essential part is either composed according to other methods (graphs or even “by hand”), or is derived from recycled material. In sum, the practice is quite largely independent of theory.

At present, let us concentrate on the few pieces in which formalization plays an important role. In analyzing works such as *Achorripsis*, *Herma* or *Nomos alpha*, one often finds “divergences”: quite often, “theoretical” data (i.e., values of pitches, durations, etc., produced by calculation) do not correspond to the “real” data (values found in the score). Thus, my analysis of *Nomos alpha* (Solomos 1993, 407-510) was able to calculate the overall rate of divergences at 18.5% (an average that does not take into account certain dimensions—densities as well as certain sieves—that pose serious problems). In the past, the existence of these divergences sometimes gave rise to discourses that presented like the mark of the fact that Xenakis was not a cold calculator. Treating the most extreme case of a system, the computer program, Henri Barraud (1968, 185) wrote that, placed before the results of the machine, Xenakis “retained what should be retained, touched up what he deemed he had to touch up, grafting his own choice (where his taste and sensitivity can intervene) on the choice of the machine [...] From that, it can be concluded that the musician's personality keeps in this work method all possibility of emerging”. Today, such a position is less pertinent, for analysis suggests that the divergences quite often result from errors. Above all, the preceding should have convinced the reader that, with Xenakis, calculation is not as important as had been thought so there is no cause for producing an ideology (a cheap humanism) to temper another ideology (Xenakis's supposed technocratic ethos).

Finally, let us examine the way Xenakis produced his theories. Mathematician readers of *Formalized Music* are always astonished by the fact that Xenakis did not reason as a mathematician: there are few demonstrations in his calculations; above all, there are applications. Xenakis readily acknowledged this: “There is, nonetheless a nuance: for me, a mathematician is someone who works with mathematics and creates theorems. Now I do not create theorems. So, in this pure sense, I am not a mathematician; rather, I am a user of mathematics” (Xenakis in Bourgeois 1969, 34). As has been seen, Xenakis functions by metaphors or transfers—which in no way excludes exactitude; to simplify: he can be presented as a poet combined with an engineer. Thus, the detailed study of the way in which the “the axiomatic” of *Nomos alpha* is constructed shows large “leaps” in the reasoning and unexplained choices.

In sum, in Xenakis's music, practice is more important than theory. It is largely autonomous and often “dynamites” it. Now, could we go so far as to say that the theoretical Xenakian edifice is not, in the final analysis, important? That it only constitutes a stimulant or a “defense” (that would avoid speaking about truly important choices), a position that had been supported by François-Bernard Mâche (1981) in particular? A more adequate response would be to redefine the notion of “theory”—hence the fact that, in this paper, I chose to put this word in quotation marks. We should distinguish between two different aspects of this notion. On the one hand, we have a “theoretical” production that would be implemented only to generate material, original sonorities. Here, the term “theory” should be abandoned: instead, we should talk about “tools”. The second aspect: the “visions”, ways of conceiving the world, which underlie Xenakis's music. Here, the word would be thoroughly adequate. As for the relation to the sciences, one could say that some of these ways of viewing things do not go via the sciences, but others call on them. This is why, for example, we cannot limit Xenakis's imaginary universe from seismic tremors (*Diamorphoses*, 1957, tape: includes earthquake sounds), telluric energy (*Erikhthon*: the title means “strong earth”), fluids and turbulences (*Horos*, 1986, orchestra), etc., to a simple naturalism. For it is not about just any vision of Nature: the Nature summoned is that of modern science, which goes from thermodynamics to the sciences of chaos and complexity (see Solomos 2004b). In this sense, there is indeed a theory with Xenakis, one that has nothing to do with a simple tool: a *theoria*.

3. A QUASI-IMMEDIATE EFFECT

The final component of the Xenakian universe which we will mention here accounts for the quasi-immediate effect of his music. It has been said, and rightly so, that Xenakis could be considered a “constructivist Fauve” (Frisius, 1987, 94). He himself sometimes evoked the quest for immediacy: “Listening to music implies many simultaneous things, one of which is to feel directly, without reflecting” (Xenakis *in* Bourgeois 1969, 29-30). Indeed, everyone listening to Xenakis has the feeling/sensation of being continually carried away, not to achieve a transcendence, another world superior to the real world, but, rather, to live a powerful, quasi-immediate physical experience. As concerns the large frescoes proposed by some polytope scores like *Persépolis* (1971, tape) or *La Légende d'Eer*, one might speak of an oceanic sensation poles apart from the “oceanic feeling” that would be provoked by the music of a Wagner, of which the discourse would be, on the contrary, to anesthetize the senses. As for the works of the last period, by their extreme tension, they provoke the feeling of a slice of raw nightmare. In sum, with Xenakis, in a way, we are no longer in the frameworks of representation. The quasi-immediate effect does not resemble the theory of passions or the ancient *ethos*. Instead, we should refer to the Dionysian: “The power of music is such that it transports you from one state to another. Like alcohol. Like love. I wanted to learn how to compose music perhaps to acquire this power. The power of Dionysios”, said Xenakis (1987, 18). It is in this sense that he always refuted the idea that music might be language:

"Music is not language and it is not message. [...] If we really think about what music is, it's the thing that escapes most the definition of language, and if one wants to apply the techniques of linguistics, I believe

one is mistaken—one is going to find nothing at all, or very little: tautology. [...] The effect that music produces often goes beyond our rational methods of investigation. Movements are created in you; you can be aware or not, control them or not. They are there, in you. So it is that music has a very profound influence on Man” (Xenakis in Lyon 1974, 133).

Xenakis achieves this quasi-immediate effect with simple musical means. The sonorities are made up of unusual sounds (massive *glissandi* in *Metastaseis*), provoking a “gripping” effect, or else extreme sounds (extreme high or low notes). Densities are elevated, sometimes to the point of saturation. Intensities tend towards the generalized *fortissimo*, over long extracts. All that condenses powerfully in the last works such as *Ergma* (1994, string quartet: **figure 7**), which add very slow *tempi* and, sometimes, homorhythms—hence the nightmarish sensation. In addition, we will note the presence of what could be described as “gestures”, which contribute to the feeling of music that constantly shakes you (see Solomos, 1996/2004, 147-156). In the case of the pieces for soloist or for chamber music, these sometimes ensue from the extreme virtuosity that Xenakis demands of his interpreters, virtuosity of a very physical nature—Xenakis apprehends his performers as athletes. Elsewhere, the gesture results from the music itself, when it focuses on extraverted or, on the contrary, introverted, repetitions. The first case is frequent up until the late 1970s, as in this excerpt of *Nuits* of which **figure 8** presents a reduction that, constituting the result of the long progressive transformation previously commented on, comes about in the manner of an explosion of energy, a vocal, homorhythmic liberation, like an explosive jubilation on the phonemes KI and E. The case of introverted gestures, of an obsessive nature, occurs, as will have been understood, in the final works, owing to repetitions that contribute to darkening the sound landscape (see the previous example from *Ergma*).

Figure 7: *Ergma*, bars 1-2. © Salabert Editions

Figure 8: *Nuits*, bars 120-126 (reduction)

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ⁱ According to Xenakis's historical article (1956, 31), there would be 1,142 sounds, a figure that also comes back in Xenakis (1971, 13), but 1,148 according to Xenakis (1992, 15), and 1,146 according to my own count.

ⁱⁱ Only the two important Xenakis interviews refer to these three "theories": a) arborescences: *in* Varga 1996 87-89; *in* Delalande 1997, 92-97; b) Brownian motion: *in* Varga 1996, 90; c) cellular automata: *in* Varga 1996, 197-198.