

THE SOUNDS OF THE ENVIRONMENT IN XENAKIS' ELECTROACOUSTIC MUSIC

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ABSTRACT

During the 20th century, sounds of the environment were used as musical material. This rupture with tradition has contributed greatly to the broadening of the concept of music. Iannis Xenakis used sounds of the environment in many of his electroacoustic works. Despite the fact that he was a member of GRM just after the establishment and during the growth of concrete music, he followed a direction diverging from the "official" one proposed by Pierre Schaeffer. His search for a "different direction" is evident not only in Xenakis's electroacoustic music but in all his musical and theoretical works; it is merged into his pursuit of freedom and originality - two extremely important issues for Xenakis.

The present paper aims to highlight the importance of Xenakis' profound relationship with the environment - nature, a relationship present in all his musical work, his theoretical-philosophical approach to music and to existence in general. It will especially focus on music composed with the sounds of the environment as music material, such as works belonging to, or affected by, concrete music and or soundscape compositions related to acoustic ecology.

1. INTRODUCTION

During the 20th century, the sounds of the environment - sounds of nature and/or sounds caused by human activity - have been used as music material. We may bring as examples Russolo and the Futurists of the early twentieth century, Edgard Varèse, Pierre Schaeffer and "musique concrete", John Cage, the soundscape compositions related to Murray Schafer's acoustic ecology etc. This rupture with tradition, which can be considered as "an opening of the ear to the sonic environment" (Mâche, 2000, p. 213) and as a "liberation", has greatly contributed to the enlargement and enrichment of the concept of music.

Iannis Xenakis is a composer who has shown great interest in environmental sounds. In his electroacoustic compositions, sound material often comes from recordings of natural sounds, such as sounds produced by earthquakes or burning charcoal, as well as sounds caused by human activity, such as sounds of jet aircrafts, dumpsters shocks, etc. Nature's paradigm has shaped many among his art works, as well as his theoretical writings¹.

Today, in this paper, I will discuss Xenakis' relationship with the sounds of the environment and their use in his electroacoustic compositions. I will start with a discussion of the xenakian approach to schaefferian concrete music, and will continue observing his approach to soundscape compositions associated to acoustic ecology.

¹ There are two important texts that focus on the relationship between Xenakis and nature. The first one is by François Bernard Mâche "Xenakis et la nature" (Xenakis and nature) in 1972 (Mâche, 2000, p. 153-166), and the second by Makis Solomos "Xenakis et la nature? Entre les mathématiques et les sciences de la nature" (Xenakis and nature? Between mathematics and natural sciences) in 2004. (Solomos, 2004a) That by François Bernard Mâche treats the relationship between art and science, between "human nature" and "physical nature", while the second, by Makis Solomos, is a study on two axes: "founding music" with pure mathematics and "naturalizing music" with natural sciences.

2. XENAKIS AND CONCRETE MUSIC

Xenakis' first electroacoustic works were composed with environmental sounds. He worked on them in the studio of the *musique concrète* in Paris, where he was introduced by Olivier Messiaen in 1954-55. (He left the studio in 1962 following the disagreements with Pierre Schaeffer). These works are:

- *Diamorphoses* (1957),
- *Concret PH* (1958) in the Philips studio - 1961 the stereo version in GRM (Delalande, 1997, p. 36),
- *Orient-Occident* (1960) and
- *Bohor* (1962).

After leaving GRM, he creates: The tape of

- *Kraanerg* (1969) and of
- *Hibiki-Hana-Ma* (1970) with registered instrumental sounds,
- *Persepolis* (1971),
- the *Polytope de Cluny* (1972) and
- *La Légende d'Eer* (1977) which includes electronic sounds.

One may also include in this group:

- *Pour la Paix* (1981), a radio-art piece, and
- *Taurhiphanie* (1987) interaction of environmental sounds with UPIC, even if, finally, the piece was realised differently (Varga, 1996, p. 193).

Looking in the years before *Metastaseis*, we see Xenakis attracted to the potentials of electronic technology. We know that in 1952 he bought a tape recorder, which he has used to do research on rhythm (Matossian, 1981, p. 61). In an article entitled "Current tendencies in French music", written in Greek probably in 1954 (Solomos, 2011b), Xenakis mentions Messiaen, Varese, Boulez, and concrete music to which he accredits a privileged position. He writes:

The most important [tendency], with unpredictable yet consequences, is that called "musique concrète". Behind this term is hidden the entire electronic world with endless possibilities of production and manipulation of real or artificial sounds and noises.

However he ends with a remark:

But for the moment, the works of "musique concrète" are only efforts and experiments without artistic claims (Xenakis, 2001, p. 28).

With *Diamorphoses* of 1957, his first electroacoustic piece, Xenakis tried to create a work with artistic claims. François Bernard Mâche writes that *Diamorphoses* "finally represented a work of "musique concrète" that surpassed the experimental level" (Mâche, 2000, p. 153). Olivier Messiaen also, listening to the piece, wrote: "These are huge and colourful spider webs whose preliminary calculations are transformed into sonic delights of the most intense poetry" (Messiaen, 1959, p. 5).

Although Xenakis was a member of GRM, just after its foundation and during the growth of concrete music, he prefers to follow a different direction than the "official" one proposed by Pierre Schaeffer. In his well-known *Treatise of Musical Objects* (Schaeffer, 1966), Schaeffer exposes the fruits of his research on a system of description and classification of sounds, based on listening. He starts by the notion of *acousmatic* (situation in which we make abstraction of the sound source) to advance to the *reduced listening* (situation in which we make abstraction of all non-acoustic parameters), and targets his research to the *sound object*, a basic sound, which could be considered as a "note" of traditional music (Solomos, 2011b). He also presented a *Solfeggio of Sound Objects*, (1967) without having the

intention, as he wrote himself in 1983, to create a *"Treatise of Musical Works"* (Schaeffer, 1983). Schaeffer believed that we should focus our efforts, at least initially (Solomos, 2011a), on the "musical research" and not to the artistic creation.

Xenakis thought differently. James Harley wrote:

Pierre Schaeffer, GRM's director, was primarily concerned with the classification and study of *objets sonores*, or "sound objects" (Schaeffer 1966). In his view, composition came *after* the materials were gathered and selected, and should be "studies, not works" (Delalande 1997, 38). Xenakis, on the other hand, was preoccupied with the architectural conception of the music, and with the creative application of mathematical principles to music. The stance of Schaeffer was that of an analyst, while Xenakis's was that of an artist. (Harley, 2004, p. 19)

Having based his own system on listening, Schaeffer did not agree with Xenakis' ideas on the use of mathematics in music. Over time, his disagreements have even taken the form of personal at times caustic, criticism. In 1970, referring to *Musiques Formelles*, Schaeffer wrote that:

After a few introductory pages [of *Musiques Formelles*] where the fate of music seems at once regulated (postulate of a mathematical music [...]), we fall headlong into the algebraic symbolism and we look in vain somewhere for a hesitation or a discussion of the results. This is for Xenakis a quasi absolute evidence, an article of the dogma, that he does not even bother to present, justify, or debate. So it is quasi impossible in writing, more than orally (I tried many times without any luck, to disturb this blind faith) to "reason" with him. (Schaeffer, 1971, p. 69)

Xenakis will also refer to his difficulties in communicating with Schaeffer, focusing on a certain mysticism of the second, but speaking also of his progressive aspect. He says:

[Schaeffer] did of course try to influence us with his strange mystical ideas - his behaviour was often destructive. He regarded himself as a disciple of a self-styled Greek philosopher from Tashkent, Gurdjieff, like Katherine Mansfield, whose suicide may have been committed under his influence. I also met others who came under Gurdjieff's spell. It was a bizarre company, advocating introspection, but in fact spreading self-destructive ideas. Schaeffer also had a damaging effect, on himself and others around, but there was a progressive aspect to his activities as well. (Varga, 1996, p. 42)

The relationship between the two men, which - despite their differences - seemed harmonious in the 50s (Solomos, 2011b), has come to an end with *Bohor*, a Xenakis' piece dedicated to Schaeffer but with turbulent effects for the ear canal of the second. In 1997 Xenakis said about Schaeffer:

This piece horrified him! He said that it was killing the eardrums, that it was dangerous to health, that I went too far, that I was crazy, that I had to obey certain rules and go humbly to learn from him how to make concrete music. (Serrou, 2003, p. 113)

The differences between Xenakis and Schaeffer also touch linguistics. Makis Solomos wrote about *Diamorphoses*:

Schaeffer introduced noise into music, but he retained from tradition the definition of music as a language, a definition which involves the idea of a double articulation: material and syntax. But the new material (noise) was rather difficult to be subjected to a hypothetical syntax. That is why Schaeffer developed the theory of the "sound object", which treats noise as a new minimal unity, like the traditional musical note. For this reason, Schaeffer says, the sound objects should not be too long, neither eccentric, etc.. *Diamorphoses* is in opposition to this point of view. Its sounds are "too" long, they are "eccentric"!

Their sources are quite often recognizable, while a “sound object” should be an abstract sonic unit, etc.. As in his instrumental music, Xenakis’ electroacoustic music breaks the opposition material/syntax. So, one of the main aim of *Diamorphoses* is to build complex sonorities emerging directly from the basic sound sources. That is why this piece is characterized by the melting of noises – and not by their combinations. (Solomos, 2011b)

Considering music as a language, Schaeffer focuses only on the study of the system, while Xenakis is thinking more about an interaction between research and creation. Here we must also consider the fact that Xenakis was self-taught in music. Instead of following the official way of conservatory education - learn an instrument, harmony, counterpoint, fugue, etc., and then compose (an abstract schema that perhaps Schaeffer also had in mind) - he starts right away with composition, following Messiaen's advice to put in music his extra-musical achievements, and in the same time he ventures into his personal explorations.

Finally, did Xenakis make concrete music? In his conversations with Delalande in 1981, he said: "I also made concrete music", but he goes on to define this music much more simply and freely than Schaeffer: concrete music, Xenakis said, is "to take sounds, to form sounds, and then to put them together in a certain way" (Delalande, 1997, p. 33). Among these three steps, he probably agreed with Schaeffer only on the first, "to take sounds". For the second and third, "form sounds" and "put them together in a certain way", Xenakis had his own ideas. According to studies made by specialists (Harley, 2002) (Solomos, 2011b), Xenakis' interests, in short, are:

- Research on sound density and its psycho-acoustic effects: Xenakis said, "[...] there is a logarithmic relationship between the increase in density and its perception" (Varga, 1996, p. 111).
- Relationship between continuity and discontinuity: We quote Xenakis: "[...] by dense mixing one can obtain continuous sounds out of discontinuous ones" (Varga, 1996, p. 111). "Continuity and discontinuity in evolution, these are two aspects of being, in opposition or in communion" (Xenakis, unpublished).
- Stochastic distributions: like in *Diamorphoses* where, as he says, he was mixing "small glissandos of bells" "in a manner consistent with probability distributions in order to obtain forms of new and interesting, of course, sounds" (Delalande, 1997, p. 39).
- Granular aspect of sound: He writes in *Musiques Formelles*: "All sound, even all continuous sonic variation, is conceived as an assemblage of a large number of elementary grains adequately disposed in time" (Xenakis, 1992, p.43).
- Construction and evolution of timbre: "[...] I put [sounds] together to try to understand their internal nature, by opposition or by similarity, to develop them, and pass from one to another" (Delalande, 1997, p. 39).
- Spatialisation of sound: highly sought by Xenakis, as in *Bohor* and many other electroacoustic and instrumental pieces.
- Macro-form: The form as *emergence*, creation of sound continuums in most of his electroacoustic pieces.

After *Bohor* Xenakis will lose the RTF studio that was the best equipped among the ones he had used so far. The other, in Cologne, was occupied by Stockhausen "the absolute master", as Xenakis called him. He also says about Stockhausen that "He had never invited me there" (Varga, 1996, p. 43) and he "didn't let anybody use the Westdeutscher Rundfunk studio" (Varga, 1996, p. 110). Anyway, Xenakis sought an "other" way in electroacoustic music, neither concrete à la Schaeffer, nor electronic à la Fourier.

Pierre Schaeffer wanted to show the superiority of concrete music over electronic music. Xenakis says, "Schaeffer despised sine waves. We are here, he said, to work with concrete sounds because they are really alive. He was right,

too" (Varga, 1996, p. 44), concludes Xenakis in 1980. In the fifties and sixties, Xenakis also preferred to use "alive" environment sounds in his electroacoustic music, rather than electronic ones. "Electronic music [as practiced at the studio of WDR] left me completely cold," he said to Varga (Varga, 1996, p. 43). Why this preference for "alive" sounds? Perhaps, because the use of "alive" sound also gives "alive" results? As far as experimentation, environmental sounds, even registered ones, carry multiple modulations; they are already animated by their own life, and so this wealth is well offered to interesting experimentations - while waveforms, pure abstractions, ask an animation from the outside (something that, incidentally, Xenakis will do later with UPIC and Gendy).

The sound spatialisation, also highly sought by Xenakis, derives from the same concern: to make sound alive. We can find the same intention in *Polytopes*: the juxtaposition of soundscapes and landscapes can be considered as an attempt to reconcile the multidimensionality of nature. Xenakis himself says: "In the case of the *Polytopes* I was attracted by the idea of repeating on a lower level what Nature carries out on a large scale" (Varga, 1996, p. 112).

3. XENAKIS AND ACOUSTIC ECOLOGY

The attention on nature's alive sounds is also a major concern of Raymond Murray Schafer, an innovator in studies of acoustic ecology, and inventor of the term "soundscape". Here, the accent goes on the ecological aspect of sound, i.e. on the relationship between living organisms and their sound environment. Schafer opts for the revaluation of the soundscape; to pass from the mediocrity of a "low fidelity" (lo-fi) soundscape, full of loud noises that mask the weak ones, to the wealth of a polysonore "high fidelity"(hi-fi) soundscape. So he proposes "ear cleaning" exercises and "soundwalks" in order to open the ears and rediscover the sound environment (Schafer, 1993, p. 273). By a charming metaphor, Schafer sees the world as "a huge composition that's going on all the time, without a beginning and, presumably, without an ending." This huge miraculous composition is around us, and it is up to us to improve it or destroy it (Schafer, 2009).

By defining soundscape, Murray Schafer opens, at the same time, the way for soundscape compositions. He writes that the term soundscape "may refer to actual environments, or to abstract constructions such as musical compositions and tape montages, particularly when considered as an environment" (Schafer, 1993, p. 274-275). The goal of soundscape compositions related to acoustic ecology, as it has been theorized principally at Simon Fraser University, is "the re-integration of the listener with the environment in an balanced ecological relationship" (Truax, 2008).

By juxtaposing Xenakis' electroacoustic works, that we treat here, with soundscape compositions related to acoustic ecology, we risk to fall into a kind of anachronism, mainly for two reasons: The first is the change of social context: The fifties and sixties are characterized by a diffuse optimism for the technological future and its impact on the human condition, which almost reached utopia (see Marshall McLuhan, Buckminster Fuller...), while the following decades are characterized by a gradual disillusionment, that reached nowadays a rather negative scepticism in addition with the emergence of a new fact: the imbalance of the ecological situation of the planet. The second reason of anachronism is the digital processing of information. The evolution of computer technology has greatly facilitated the technical side of electroacoustic composition - instrumental also - and offered new opportunities for artistic expression. Taking into account this risk of anachronism, we can juxtapose Xenakis and acoustic ecology and make some remarks on a conceptual and aesthetic level:

Already, in an era of low ecological sensitivity, Xenakis wrote the piece *Pour les Baleines* (For the Whales) (1982) to support the cause of Greenpeace. He notes on the score that by fighting for whales and dolphins we fight at

the same time for human rights. Furthermore, in 1989 he signed, "L'appel pour les Baleines" (The call for Whales) of the Réseau-Cétacés (lejournalnature.com).

It is known that the observation of soundscapes was for him a source of inspiration and almost inexhaustible discoveries. The formulation of well-known concepts such as "sound clouds", "arborescences" or "random walk" etc... comes directly from the observation of nature and its operation. Xenakis considers music as a mental activity, sharing the same abstract structures, mathematical or other, with the world around us. So his intention will focus on appearances, but at the same time, and much more intensely, on exploring the "hidden reasons" behind appearances; the laws that animate - that give movement to - natural phenomena (Paparrigopoulos, 2011). The observation led him to abstraction, and abstraction will soon become the xenakian characteristic par excellence.

Murray Schafer refers to Xenakis' relationship with the sounds of the environment in his book *The Soundscape: Our Sonic Environment and the Tuning of the World* (Schafer, 1993). In a subchapter entitled "Gestures and Textures", he treats the growth of sound textures in the post-industrial environment, to the detriment of isolated gestures. By examining the perceptible effects of a texture, he shares the idea of Xenakis on the emergence of sonorities called of "second order". Citing Zeno's paradox of the bushel of corns, Schafer points out that: "The aggregate sound of a texture is not merely a simple sum of a lot of individual sounds - it is *something different*" (Schafer, 1993, p. 159). Schafer sees the introduction of probabilities in music by Xenakis, as a consequence of the increment of textures - masses of sound - in the modern soundscape, and he notes that "Xenakis has drawn his inspiration directly from the observation of the contemporary soundscape" (Schafer, 1993, p. 158-159). In this regard, he cites the well-known text of Xenakis for the passage from order to disorder, in the anti-Nazi demonstrations in Athens during the occupation.

Indeed, Xenakis does not seem to be too "embarrassed" by the powerful sounds of the modern environment, which disturb the "high fidelity" soundscapes desired and sought by Schafer. In his musical research, his intention is rather directed towards the exploration of the new lands that contemporary soundscapes reveal, than towards noise pollution (without becoming an admirer of traffic sounds like Cage). He is essentially a child of his time, fascinated by the scientific-technological progress and the sonorities that accompany it; he will not hesitate to mix the powerful mechanical noise with a bucolic and peaceful nature - the sounds of jet aircrafts with these of small swiss bells. We must also consider that Xenakis grew up in the war. He participated in armed resistance and even kept the memories engraved on his face. He lived the ferocious soundscape of whistling bullets, crackling machine guns, bomb explosions, warning sirens, or the silence, "a detonating calm, full of despair, dust, and death" (Xenakis, 1992, p. 9).

Aesthetically, Xenakis' compositions, electroacoustic or instrumental, often have an orgiastic, dionysian pronounced aspect (Solomos, 2004b). If for him "[...] the qualification 'beautiful' or 'ugly' makes no sense for sound" (Xenakis, 1992, p. ix), yet he has an attraction to the Kantian "sublime"; to burst, the excessive brute force, the gigantic, as in *Bohor*, this extraordinary "chthonian" soundscape, "with the potentiometers to maximum" (Schaeffer, 1981, p. 85). We may also mention his daughter's memories of Corsica, where "He was waiting for summer storms and when the lightning and the rumble of thunder were right over our heads, he was running up the mountain to be at the heart of the storm" (Xenakis Makhi, 2011).

This fascination for the sublime-grandiose phenomena is also present in Xenakis' architecture, as in the proposition for the *ville cosmique* (cosmic city), this urban utopia (Choay, 1965) of huge constructions with kilometres of height. Not to forget his projects "to create intercontinental sound and light shows" and "northern lights in temperate regions" of the globe, or a "laser show on the heights of Paris, accompanied by music played by warning sirens that normally are useless" (Matossian, 1981, p. 273).

4. EPILOGUE

The use of environmental sounds as musical material is already part of the history of music. There are periods, schools, genres, styles ... Xenakis' position in this narration is particular, "different". This "differentiation" is evident not only in his electroacoustic music, but in all of his artistic and theoretical works. It is also, and above all, in convergence with his pursuit of freedom and originality - two extremely important issues for Xenakis (Paparrigopoulos, 2008) that we did not address here, but were, nonetheless, always present.

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