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## Research on the First *Musique Concrète*: The Case of Xenakis's First Electroacoustic Pieces

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### Abstract

Xenakis's first electroacoustic pieces (*Diamorphoses*, 1957; *Concret PH*, 1958; *Analogique B*, 1959; *Orient-Occident*, 1960; and *Bohor*, 1962) can be called *musique concrète*. Indeed, these works use the *concrète musique* tape techniques. But their spirit and aesthetic is very different from those set forth in Pierre Schaeffer's theories. In fact, these works are quite particular in their whole conception. The two authors of this article are researching this period of Xenakis's electroacoustic music. In this article, they offer a brief survey of the issues these works raised. To illustrate some of these issues, they use *Diamorphoses* and *Bohor* as examples.

### 1. Research on Xenakis's *musique concrète* pieces

#### 1.1. Xenakis's *musique concrète* pieces

Xenakis's electroacoustic music can be divided into four main categories, which also correspond to a chronological division. The latter three categories contain, respectively: the polytopes (1969–1977), the works composed with the UPIC system (1975–1989), and works composed with the GENDYN software (1991–1994). This paper deals with the first category. It contains Xenakis' five *musique concrète* compositions: *Diamorphoses* (1957), *Concret PH* (1958), the tape part of *Analogique* (*Analogique B*, 1959), *Orient-Occident* (1960), and *Bohor* (1962).

Three of these works (*Diamorphoses*, *Orient-Occident*, and *Bohor*) were composed in the GRM's studio and *Concret PH* and *Analogique B* also partly used the GRM's studio<sup>1</sup>, where, during that period, Xenakis was a major collaborator. Xenakis was interested in *musique concrète* as early as the beginning of the 1950s. Through Olivier Messiaen's recommendation (cf. Matossian, 1981: 90), he met Pierre Schaeffer in 1954, and began to work at the GRM, becoming more and more involved in GRM's projects. It is important to note that before *Diamorphoses*, Xenakis had already composed his two major orchestral pieces, *Metastaseis* (1953–54) and *Pithoprakta* (1955–56). His collaboration with the GRM culminated with the famous "Concert collectif" (beginning of the 1960s), which he directed (cf. Delalande and Gayou, 2001; Mâche, 1986). Towards the end of the 1950s, Xenakis began to have important disagreements with Schaeffer over several matters. In 1959, Schaeffer criticized *Analogique B*, a work that develops the granular paradigm. The latest clash took place in 1963, when Xenakis proposed the use of mathematics and the computer in the studio. On Schaeffer's refusal, Xenakis left the group. Would he have stayed at the GRM, he would have continued to compose *musique concrète* works.

The corpus constituted by the five pieces that Xenakis composed in this period is very important. First, it is important for Xenakis's own production, not only because these pieces are masterpieces but also because each one develops singular theoretical and experimental concepts very important to Xenakis's evolution as a whole. Second, it is important to the history of *musique concrète*, because of the importance and the singularity of Xenakis's contribution even with only five pieces and approximately eight years of collaboration with the GRM. This importance is recognized by the founder of *musique concrète*, Pierre Schaeffer, who, in his historical *Que sais-je?*—the first book on *musique concrète*—includes Xenakis among the pioneers of and major contributors to the GRM (cf. Schaeffer, 1967 : 81–82).

## 1.2. Literature on Xenakis's *musique concrète* pieces

At the moment, only few musicologists have dealt with these five pieces, producing articles mostly consisting of musical analyses. For *Diamorphoses*, we have musical analyses by Stefania de Stefano (1998), Thomas Delio (2002), Rudolf Frisius, 2009, Martha Brech (2009) and Makis Solomos (2002 and 2011). *Concret PH* has been analyzed by Renaud Meric (2005), and Séverine Bridoux-Michel (2005) comments on its relationship with Pavillon Philips's architecture. *Analogique B* has received the attention of the musical community that deals with the granular paradigm, and especially of Agostino Di Scipio (2005) and the computational community (Angello Orcalli (1993), Sinan Bokesoy (2004), Curtis Roads (2001), Andrea Arcella-Stefano Silvestri (forthcoming)). For *Orient-Occident*, Makis Solomos (2009) makes a comparison between the film and the concert versions. Finally, for *Bohor*, there are four analyses, by Pierre Couprie (2005), Tobias Hünemann (2009), Kim Rebecca-Liubo Borissov (no date), and Benoît Gibson (forthcoming). Of course, there are also general studies, in particular those of James Harley (2002, 2009).

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<sup>1</sup> For *Concret PH*, Xenakis worked also in Philips's studio and for *Analogique B* in Gravesano's studio.

If the instrumental pieces of that period are well documented by Xenakis himself, this is not the case with his electroacoustic pieces, with the exception of *Analogique B*.<sup>2</sup> For instance, for *Diamorphoses* we only have at our disposal two small sentences in *Formalized Music*, two small unpublished texts, and two paragraphs in his two major interviews (cf. Solomos, 2012). Another example: There are four published interviews referring to *Bohor*. Two of them (Varga, 1996, 1980:42) (2006: Serrou, 54), briefly allude to the fact that the piece created a scandal in Paris and that Schaeffer, to whom the work is dedicated, hated it. More informative is the interview with François Delalande (1997), from 1981. We learn that, in *Bohor*, Xenakis made no calculation and adopted an intuitive approach. Xenakis acknowledges that the idea of immersion is an important feature in *Bohor*, and that *Bohor* needs volume for the ear to penetrate into the sound and hear the minute details of the sonorities.

If there are only few writings by Xenakis on these pieces, fortunately there exists important documentation in the Xenakis Archives.<sup>3</sup> There are two kinds of archives. The first consists of various kinds of manuscripts, divided into “Œuvres musicales” (compositional sketches), “Écrits” (writings), “Carnets” (notebooks containing various materials: compositional ideas, ideas on writings, notes from journeys, drawings...), “Manuscrits” (for scores), “Partitions” (published scores), and “Dossiers architecture.” The second kind of archive is very important to electroacoustic music: It contains all the preserved tapes. These tapes consist of various recordings, and, most importantly, contain the materials of the electroacoustic works. For example, for *Diamorphoses*, our first example, the “Dossiers œuvres” and “Carnets” of the Archives contain very important materials (but not as important as those for *Metastaseis* or *Pithoprakta*—probably some material has been lost). As another example, three folders are primarily concerned with *Bohor*. The first two, classified under Xenakis’s writings (Écrits), contain various drafts and versions of short program notes. The third folder, classified under Xenakis’s Œuvres, consists of sketches, most of which can be divided into two categories: spatial distributions of channels and loudspeaker and sketches representing individual tracks or the whole piece. As for the sound archive, there are many audio files on which we are working. For *Diamorphoses*, there are fourteen files that can be divided into Materials, Versions, and Other. As regards *Bohor*, there are nineteen files that can be divided into four categories (Versions, Tracks, Materials, and Other).

### 1.3. Issues

What kinds of issues and questions are raised by past and present researchers on Xenakis’s *musique concrète* pieces, and are likely to continue to be raised in the future?

First, we have issues related to all the questions that are called genetic. For the moment, not much research on Xenakis’s first electroacoustic music deals with these kinds of issues because access to the Xenakis Archives is relatively recent. Surely it will develop, but maybe not very fast, since this access to the Archives is restricted. As we have seen with the examples of *Diamorphoses* and *Bohor*, there are two kinds of archives. Research on the second kind, the audio archives, is new, and much work regarding it remains.

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<sup>2</sup> *Analogique B* constitutes an exception, due to the fact that Xenakis wrote one extensive article about the granular paradigm, which became a chapter of *Musiques formelles* and which contains important elements for analysing *Analogique A and B* (cf. Xenakis, 1963, chapter 2).

<sup>3</sup> Until recently (June 2014), the Xenakis Archives were on deposit at the Bibliothèque Nationale de France.

Second, these works raise musical questions, i.e., analytical and aesthetic questions. Some of them were addressed or referred to by the above mentioned authors in their musical analyses. But many more questions remain to be raised. Since we are dealing with electroacoustic music, this first series of questions is about the sounds used, that is, about the musical material: Did Xenakis himself record the sounds or did he take them from recordings? For instance, many of the sounds used in *Orient-Occident* were probably taken from the GRM's sound library, and are found in pieces by other GRM's composers, while, for *Bohor* or *Diamorphoses*, he performed many sounds himself. Are these sounds instrumental or are they noises? And what about their transformations? Did Xenakis use alternative technologies other than the standard one (for instance, in *Diamorphoses*, he used the "phonogène" and probably also the "morphophone," which were inventions of Jacques Poullin). Many other musical questions concern the form of the pieces, new theories about what constitutes a sound (we think here about the granular paradigm), etc.

Finally, many questions Xenakis's first electroacoustic compositions raise are of a historical nature. This series of questions will probably develop in the future. One main interest is, of course, to analyze Xenakis's role at GRM, which was very important, as has been said. Thanks to the inventory made by Jocelyne Tournet-Lammer (2006),<sup>4</sup> we have a list of all the GRM's meetings, including those at which Xenakis was present.

## 2. *Musique concrète*?

To illustrate only one kind of issue raised by Xenakis's first electroacoustic compositions, we have chosen one major question: What is Xenakis's vision of *musique concrète* as opposed to the classical idea of *musique concrète* developed by Pierre Schaeffer in his well-known writings, in particular his *Traité des objets musicaux* (Schaeffer, 1966)? We will deal briefly with this question in reference to the first and last *musique concrète* compositions, *Diamorphoses* and *Bohor*, previously used as examples about the available documentation. We shall limit ourselves to the question of the sound materials.

### 2.1. *Diamorphoses*

Even if it is Xenakis's first *musique concrète* piece, *Diamorphoses* already presents a singular conception of *musique concrète*. One major difference with Schaeffer's ideas is the question of the "sound object." According to Schaeffer, a "sound object" would be a kind of substitute for the notion of note. That means that it would be neither too long, nor too short, and, more generally, in Schaeffer's terms, not "eccentric." This is not at all the case with *Diamorphoses*'s sounds! There are two kinds of sounds in this piece. The first are various kinds of noises. **Figure 1** presents the names that we found in various sketches for these sounds. Probably Xenakis took them from GRM's recordings or from other recordings available at GRM. Some of them are truly "eccentric" because there are very long. Besides,

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<sup>4</sup> In 1967, Jocelyne Tournet-Lammer entered the Service de la Recherche at ORTF (the French radio-television), and had to organize Pierre Schaeffer's personal archives. Her book contains the description of many events: meeting or seminar recordings, articles and books, video recordings, broadcasts, etc. As for Xenakis, the information about GRM's theoretical sessions and the public recordings in which he participated is very important. His participation goes from 6 October 1958 (it is at this time the theoretical GRM session began) to 1 June 1962 (when Xenakis withdrew from the "Concert collectif" project).

Xenakis does not present them in an isolated form, as if they were sound objects to be combined, but so as to fuse them together. As he said to François Delalande:

J'étais très content de pouvoir utiliser, de nouveau dans *Diamorphoses*, des bruits qui n'étaient pas considérés comme musicaux et que, je crois, personne n'avait utilisés de cette façon-là avant moi. Je prenais des chocs de bennes, des choses comme ça, des tremblements de terre enregistrés vite, et puis je les mettais ensemble pour essayer de comprendre aussi bien leur nature interne, par opposition ou par similitude, et de les faire évoluer, et faire passer de l'un à l'autre. Et ça, ça ne pouvait se faire qu'en travaillant sur le tas avec le matériau même. En mettant ses mains dedans, dans ses intestins, et pas d'une manière abstraite" (Xenakis in Delalande, 1997 : 39).

*avions* airplanes  
*avion à réaction* jet  
*tonnerre* thunder  
*chocs de benne* [sometimes: *bennes à ordure*] skip/dumpster/wagon/waster disposal/garbage  
truck's shocks  
*concasseurs* crushers  
*cailloux* pebble  
*explosions de bombes* bomb's explosions  
*perceuses* drill  
*ionosphère* ionosphere  
*scie* saw  
*vent* wind  
*tremblement de terre* earthquake  
*meteor* ???  
*coups de feu* shots  
*coït* coitus  
*terre seule* earth alone  
*bruit de fond* background noise  
*sifflement* whistle

**Figure 1. Names for noises used in *Diamorphoses*.**

To recognize immediately the difference between Xenakis's and Schaeffer's views about how to deal with sounds, one can compare the beginning of *Diamorphoses*, which mixes different sounds but within a single texture, with the beginning of Schaeffer's first *Étude aux objets* (1959), "Objets exposés," which successively presents eight sound objects, clearly delimited.

The second kind of sounds in *Diamorphoses* Xenakis produces with tiny bells. He recorded himself playing many strokes and then mixed together several recordings, producing homogeneous textures that generated new, longer, sounds: It is already a kind of granular experimentation, that Xenakis conceived as experimentation on the logarithmic perception of density. As he wrote in a letter:

With the bells I did a double study: a) how many short sounds can we perceive in a short  $\Delta t$  (up to 5, then we lose the counting ability); b) the sensation of density (numbers of sounds / sec) and the law that binds sensation and density. For b) I found the law is logarithmic with a base between 2 and 3, this is why I choose the number  $e = 2,718$ . A consequence of this finding was the formula (p. 136 in *Formalized Music*) for the ST instrumental music series [...].”<sup>5</sup>

Another important difference between Xenakis’s sounds and Schaefferian sound objects concerns the question of “reduced listening.” In Schaeffer’s view, the composer must hide the origin of the sounds—to make them abstract (just as a note is supposed to be abstract). As for the listener, he or she has to listen to them as pure morphologies, not trying to guess their origin. Totally in opposition to that view, in *Diamorphoses*, Xenakis very often clearly shows the origin of the sounds. For instance, we easily recognize the sounds of a jet at the beginning of the piece. More interestingly, sometimes he plays with the supposed origin of the sounds. The beginning of *Diamorphoses* is again characteristic: The background noise could be an “earthquake” or the “wind,” which are the words used by Xenakis in his sketches, but might have another origin. In fact these words are probably metaphors: This beginning establishes a very strong poetics for the whole piece, which could be named “Dionysian,” i.e., fusion with nature (cf. Solomos, 2004).

## 2.2. *Bohor*

*Bohor* is presented as the first piece conceived for eight channels (quadruple stereophony). Various sources cite 15 December 1962 as the date when *Bohor* premiered, but we have found no evidence yet supporting that claim—no program or reviews.

Xenakis’s first sketch related to *Bohor* is found in GRM’s archives. It was probably drawn before Xenakis started working on *Bohor*. It shows that Xenakis had planned a ten-minute piece for three channels, each one characterized by sound complexes mainly deployed in three registers (low, medium, and high).

By comparison, **Figure 2**<sup>6</sup> reproduces an excerpt from a plan Xenakis sketched in the 1980s from listening to *Bohor* many years after it was completed. It shows eight channels, and that channels 1, 3, 5, and 7 are duplicated. Dynamics are clearly indicated as well as other details that constitute the internal plurality of *Bohor*. The sketch also reveals information about the sounds. The original tapes (channels) are identified as Organ, Piano, Byzantium, and Irak.

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<sup>5</sup> Xenakis’s letter to Doati (?), 17-7-1988. Xenakis Archives, Dossier œuvres musicales 14/3.

<sup>6</sup> Figure 2 was drawn from the original sketches found in the Xenakis Archives, Dossier Œuvres musicales 33/11.

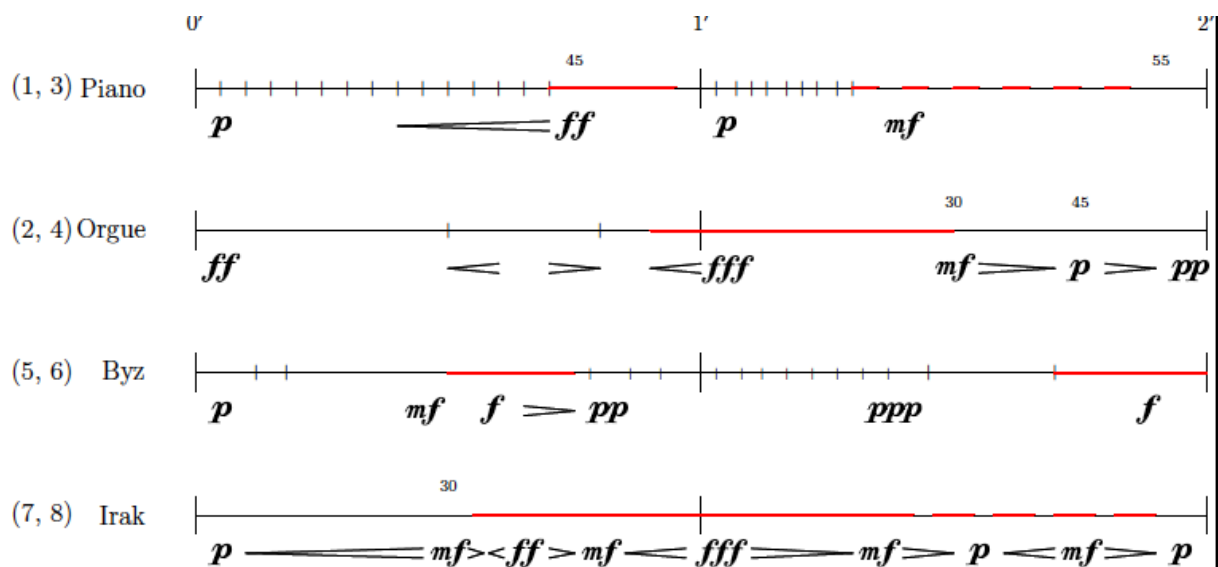


Figure 2. Excerpt from a plan sketched by Xenakis in the 1980s from listening to *Bohor*.

Organ corresponds to the sounds of a Laotian mouth organ. The Laotian mouth organ, also known as *khene*, is a wind instrument from southeast Asia. It consists of two rows of bamboo pipes and a hardwood reservoir through which air is blown.

Certain elements suggest the sounds identified as Piano were produced by playing inside a piano with small objects (probably some of those referred to as Byzantium and Irak). These sounds consist mainly of glissandi and strokes.

It is unclear what Xenakis meant by “Byzantium” or “Irak.” Byzantium and Irak could be associated with pieces of jewellery or particular sounds. In the audio archives concerning *Bohor*, the only bell Xenakis referred to is a bronze bell, like the ones sold to tourists that Xenakis brought from Japan in 1961.<sup>7</sup> As for jewellery, the only reference to jewellery is a musical anklet from India.

Documents found in the Xenakis Archives reference the origins of the sounds of *Bohor*. “*Affolants*,” for example, very likely refer to thunder sheet, a thin sheet of metal (steel) shaken to produce noises,<sup>8</sup> corresponding to the white noises at the end of *Bohor*.

What is interesting about *Bohor* is that Xenakis performed very few manipulations. He seems to have limited himself to filter and reverberation devices. But the key element to understanding how *Bohor* was composed is speed. By slowing down the speed, Xenakis not only prevents us from perceiving the origin of the sounds, but invites us to enter the sound.

If we do the reverse and play *Bohor* eight times faster, some of the original sounds emerge, those of the Laotian mouth organ, for example. Where do these sounds come from? Recordings? The whole sequence can actually be played on a mouth organ, and audio files found in the BNF Sound Archive reveal that Xenakis performed the sequence himself. In fact, all the materials used in *Bohor* seem to be taken from recordings made by Xenakis as

<sup>7</sup> BNF Sound Archive, DONAUD 0602 (000509), Xenakis 530.

<sup>8</sup> Xenakis describes what he means by “*affolants*” in the notes to the score of *Persephessa* (1969) for six percussionists, Éditions Salabert.



performer. This gives an instrumental feel to the piece. And because there are very few manipulations, apart from tape-speed changes, any contrasts had to be planned or improvised in the “heat of the moment.”

In this article, we have shown some of the questions raised by Xenakis’s electroacoustic music and illustrated them with examples taken from *Diamorphoses* and *Bohor*. Our intention was to present some of the research we are carrying out on Xenakis’s first electroacoustic music.

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