

SELF-BORROWINGS IN THE INSTRUMENTAL MUSIC OF IANNIS XENAKIS

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Abstract

As one of the most important composers of the twentieth century, Iannis Xenakis is also known for having used mathematical models in his compositions and for developing a formalization of music. But Xenakis's compositional processes did not rely only on mathematics. Like many other composers, he borrowed extensively from his own works. These borrowings, which cannot be properly regarded as self-quotations, did not always relate to theoretical problems. Most of the time, they were selected for their particular sonic qualities or transformed in order to create new ones. This presentation examines the extent of self-borrowing in the music of Iannis Xenakis and shows how the composer made use of montage techniques as a means of producing different kinds of objects or textures.

INTRODUCTION

Iannis Xenakis figures among the most important composers of the twentieth century. Besides an extensive work, he left many writings which reflect his interest in concepts developed by science and philosophy. Trained as an engineer, Xenakis sought the theoretical basis that lies behind such notions as indeterminism, determinism, symmetry, etc. He invokes mathematics, probability theory, group theory, etc, but says little about his own music, leaving this task to others. A close analysis of his music, however, shows that he did not rely only on mathematics or science. Many times Xenakis practiced self-borrowing. He is not the first composer to do so. In the history of music, the number of composers who borrowed from their own works is such that it can be considered as normal. But as far as Xenakis is concerned, apart from *ST/4*, which is a version for string quartet of *ST/10*, only one work is explicit about its relation to previous works: *Mosaïques* (1994) for orchestra, as mentioned by its subtitle, puts together excerpts from pieces written between 1987 and 1991. *Mosaïques* may be the only work to reveal its sources, but Xenakis's first self-borrowings go back to the end of the fifties.

The extent to which Xenakis borrowed from his own works allows us to consider montage techniques as one of his compositional processes. Speaking of montage about a composer to whom we usually associate the use of abstract calculations may surprise. But the concept of montage is multiform [3]. In music, it usually relates to combinations of heterogeneous or ready-made materials. Moreover, many of Xenakis's formal models rest on combinations of predefined elements. *Achorripsis*, *Analogique A*, *Syrmos*, etc., appear as superpositions and juxtapositions of predefined textures or sonic entities. These models may have furthered the use of montage techniques as compositional process.

SIMPLE BORROWINGS

Self-borrowing implies choices about the selection and the insertion of materials. Xenakis can select a passage in its entirety or isolate a layer, an instrument or a group of instruments: strings, brass, woodwind, percussions, etc. These layers, once removed from their original context, become independent entities. They can be exhibited alone or combined with other layers. Sometimes, Xenakis also filters some textures to fit new instrumental contexts. If the density is too low, it can be increased “by hand”. As for duration, it can be shortened or lengthened according to the nature of the chosen material: elements, objects, some structures have an intrinsic duration. Otherwise, it can be determined by other criteria such as formal proportions or the composer's will. The following examples illustrate different applications of self-borrowed materials.

Elements

On occasion, Xenakis extracts from an earlier piece a single element. For example, at bar 93 of *Antikhthon* (1971) for orchestra, a cluster sustained on the bridge by the violins, violas and basses gradually turns into a chord of harmonics (Fig. 1). On this process of transformation, Xenakis adds an iterative element. The cellos repeat the same *glissando*.

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Fig. 1: *Antikhthon*, bars 93-95.

This *glissando* is lifted from *Nomos Alpha* (1965-66) for solo cello (Fig. 2), which according to the composer, used permutations of macroscopic sound complexes. In its original context, this *glissando* was considered as a “relatively ordered descending field of sliding sounds” [7].

Fig. 2: *Nomos Alpha*, L (13,11) bars 23-24.

The oppositions field—cloud, ordered—ataxic, ascending—descending and sound-points—sliding sounds, that characterized *Nomos Alpha*'s macroscopic sound complexes, do not apply in *Antikhthon*. In the latter, the element, taken in its entirety, is combined with another layer and prolonged by a loop.

Object

When elements are tightly linked together, they form a particular object. This is the case with arborescences. The concept of arborescence refers to graph theory, which evolved from the second half of the nineteenth century. Graph theory defines an arborescence as a directed graph whose components are out-trees. Its main purpose is to study the properties of graphs. But Xenakis, in his music, is not concerned about the theoretical meaning of arborescences. What matters is the macroscopic object of melodic lines coordinated by nodes.

Erikhthon (1974) for piano and orchestra relies essentially on arborescences. Xenakis developed a graphic writing for piano that he repeated in many works. The following example shows an arborescence played by the piano in *Erikhthon* (Fig. 3). It is accompanied by low sustained sounds played by the wind.

$\text{♩} = 60 \text{ MM}$

bn 1
bn 2
bn 3
cbn
tb. 1
tb. 2
tb. 3
tuba

Piano

1/1 Rea

5

*

Fig. 3: *Erikhthon*, bars 70-72.

Xenakis rewrote this arborescence in *Akanthos* (1977), for soprano and eight musicians, with a new dynamic contour and in a different context. He displays it with a new layer of sustained sounds, played by the voice, the flute and the strings, in the background (Fig. 4).

At another speed—Xenakis slows down the tempo— but recovering its original dynamic contour, the same arborescence reappears in *Palimpsest* (1979) for 11 musicians. This time, it is submerged by the entanglement of oscillating melodic lines (Fig. 5).

As independent objects, arborescences can be repeated and exhibited in different contexts.

♩ = 60 MM

fl. (G)

cl. b.

pno

sop.

strings

The score for 'Akanthos' (bars 68-70) features a tempo of 60 MM. The flute (G) part begins with a *pp* dynamic, followed by a crescendo to *fff* and then a *f* dynamic. The clarinet in B part is mostly silent, with a final note at the end. The piano part is highly textured, featuring triplets and a quintuplet, with dynamics ranging from *p* to *fff*. The soprano part starts with a *f* dynamic, reaches *fff*, and then returns to *f* before ending with a *mp* dynamic. The strings play a sustained chord in the key of G major, marked *p*.

Fig. 4: *Akanthos*, bars 68-70.

♩ = 50 MM

c.a.

cor

Pno

vl. I

vl. II

cb.

The score for 'Palimpsest' (bars 103-105) features a tempo of 50 MM. The cor Anglais parts play a melodic line with a *f* *legatissimo* dynamic. The piano part is highly textured, featuring triplets and a 7-4 pattern, with dynamics ranging from *mp* to *ff*. The violin I and II parts play a melodic line with a *ff* *legatissimo* dynamic. The cello part plays a rhythmic accompaniment with a *ff* *legatissimo* dynamic.

Fig. 5: *Palimpsest*, bars 103-105.

TRANSFORMATIONS

Literal borrowings produce the most perceptible effect of montage, at least visually. But the study of self-borrowings in Xenakis's work is confronted with the variety of techniques used to transform the materials. Frequently, Xenakis changes something, whether it be not to repeat himself, or to dissimulate the sources of his borrowings. From literal repetition to imperceptible micro-montage, the variety of transformations is considerable. Some of these transformations are secondary, like small variations, and determined by the context in which the excerpts occur. Among these transformations are the prolongation or contraction of durations, changes of dynamics, tempo, etc. Even though they are secondary, these transformations are sufficient to modify an excerpt so that it would be impossible to recognize by ear. There are also deviations, more or less voluntary, that we find frequently when we compare an excerpt with its source. They concern changes of accidentals, repetitions or omissions that occur as by accident during the transcription.

The main transformations are considered as manipulation or treatment depending upon whether they modify the form or the content of the chosen excerpts. Manipulations concern the arrangement of the elements. The simplest manipulation limits itself to the retrograde form, to transcribe a score in the reverse order. Other manipulations depend on how the excerpts are taken from the score. Permutation extracts the elements and disposes them in another order. Remix combines melodic lines taken from different places. It recreates a same texture from the superposition of independent lines. Finally, micro-montage combines these two operations in an overall patchwork.

If manipulations refer to the arrangement of the elements, to how these elements are disposed in the score, treatments modify the content of the excerpts. With respect to Xenakis's self-borrowings, the most frequent treatment consists in changing the instrumentation. Apart from simple cases such as where Xenakis transcribes a voice for an instrument of the same family —as, for example, a piano part played by the harpsichord, or, when the instrumentation of two pieces differs slightly, horn parts played by trombones— other changes accentuate the difference between the original text and its repetition. These modifications can alter the text considerably. They increase the possibility of transfer, as they do not restrain themselves to instruments of the same family. If we could disclose the sources of some excerpts hidden in earlier works by comparing the instrumentation of the scores, new instrumentations force us to broaden our researches. Everything, almost, can serve as a starting point. The following examples illustrate the variety of techniques that Xenakis used in order to transform his self-borrowings.

Simple Repetition

N'shima (1975), for 2 female voices, 2 horns, 2 trombones and a cello, is a piece horizontally compact. It evolves in a restricted range, with melodic lines in which the attacks are strongly accentuated (Fig. 6).

The image shows a musical score for four instruments: Cor 1, Cor 2, Tb. 1, and Tb. 2. The tempo is marked as quarter note = 60 MM. The dynamics are marked as ff (fortissimo). The score shows complex rhythmic patterns with many accents and slurs.

Fig. 6: *N'Shima*, bars 191-193.

In 1985, Xenakis, who had a great admiration for Japan, was commissioned a piece by a traditional Japanese music ensemble. The ensemble gathered 2 kotos, a shakuhashi and a sangan. The koto is a kind of zither with 13 strings tied over stationary bridges; the sangan, or shamisen, a kind of three-stringed lute; and the shakuhashi, a small bamboo flute. In *Nyuyo*, Xenakis sought to alloy eastern tradition with western writing.

An excerpt from *Nyuyo* (Fig. 7) redraws the broken melodic lines of *N'Shima*. The two kotos are given the trombone parts; the shakuhashi and the sangan, the horn parts. This new instrumentation implies some adjustments though, as the four instruments in *Nyuyo* share the six voices of *N'Shima*. It is important to notice the distance between these two pieces: ten years. But, what is even more striking, is the length of this sequence borrowed from *N'Shima*: sixty-nine bars, that is, almost a third of *Nyuyo*. It probably is the longest excerpt that Xenakis transcribed.

Fig. 7: *Nyuyo*, bars 93-94.

Permutation

The end of *Akea* (1986) for string quartet and piano superposes two distinct layers: the piano plays chords in the extreme registers while the string instruments move in counterpoint. (Fig. 8).

Fig. 8: *Akea*, bars 84-86.

A sequence of *Kyania* (1990) for orchestra repeats this passage of *Akea*. Xenakis does not transcribe the sequence as it was, but subdivided it in fragments that he then permuted. Furthermore, these fragments do not correspond to the bars. They are shifted from three quavers (Fig. 9). A permutation precedes a new instrumentation of each voice. Xenakis writes for the woodwind, trombones and strings the chords that were played by the piano while the other brass instruments draw the counterpoint originally played by the strings.

Remix

In an interview from around 1969, Xenakis said about *Anaktoria* (1969) for eight musicians: “ from a formal point of view, this piece was not calculated. There is no calculation. Or better, there is second order calculation. That is, encounters of sonic entities, textures or sonic structures played by the strings or the wind.” [6] Among these sonic entities, *Anaktoria* redraws some entangled melodic lines of *Nuits* (1967), for mixed choir of at least 12 voices, (Fig. 10). Xenakis first dissociates the voices of *Nuits*, then makes some choices and mixes them again. Each voice is

part of a texture of superposed continuous lines, marked by accents, tremolos, and to which Xenakis gives a new dynamic contour. The viola part is transposed as if the second tenor part in *Nuits* were read in the bass clef (Fig. 11).

The musical score for *Kyania*, bars 14-15, is presented in a multi-staff format. The tempo is marked as ♩ = 55 MM. The score includes parts for Flute (fl.), Horn (hb.), Clarinet (cl.), Bassoon (bn.), Cor Anglais (cors), Trumpet (tp.), Trombone (tb.), Tuba (tu.), Violin I (vl. I), Violin II (vl. II), Viola (a.), Violoncello (vc.), and Contrabass (cb.). The woodwind and string parts feature complex rhythmic patterns, including tremolos and accents, with some sections marked with a 9:6 ratio. The brass parts are marked with dynamics such as *fff*, *f*, and *mp*. The percussion part (tu.) is marked with *mp*. The overall texture is dense and layered, characteristic of Xenakis's style.

Fig. 9: *Kyania*, bars 14-15.

Fig. 10: Excerpts from *Nuits*, bars 54-60.

Fig. 11: Excerpt from *Anaktoria*, bars 144-146.

Micro-montage

Idmen (1985), for mixed choir and six percussionists, comprises two parts: A and B. The last sequence of *Idmen B* superposes five rhythmic layers. Each one of these layers unfolds transformations of a motif based on a combination of short or long values distributed in different registers (Fig. 12).

Fig. 12: Excerpts from *Idmen B*, bars 29-30.

A sequence from *à l'île de Gorée* (1986), for amplified harpsichord and instrumental ensemble, appropriates some rhythmic motives developed in *Idmen B* (Fig. 13). Each of the rhythmic layers is differently orchestrated: winds, brass, harpsichord's right hand, harpsichord's left hand and strings. In addition to this new instrumentation, the motives are freely permuted by the composer. A micro-montage preceded this new instrumentation of the motives.



Fig. 13: Excerpts from *À l'île de Gorée*, bar 127.

Mode of playing

It is well known that Xenakis very often conceived his music with the help of graphic aids, on a Cartesian plan with time in abscissa and pitches in ordinate. Music is represented by points and lines. A point shows the punctual type of an attack; a line, a sustained sound or the relation between two points. By gathering all elements in the same plan, it may be difficult to follow a voice precisely. On the other hand, this kind of representation permits one to visualize the global evolution or transformation over time of masses of sounds. The following figure shows a graphic representation of an excerpt from *Pithoprakta* (1957) for string orchestra, two trombones, xylophone and a wood-block (Fig. 14). On this graphic, the lines mark the relation between attacks of “ arco ” sounds.

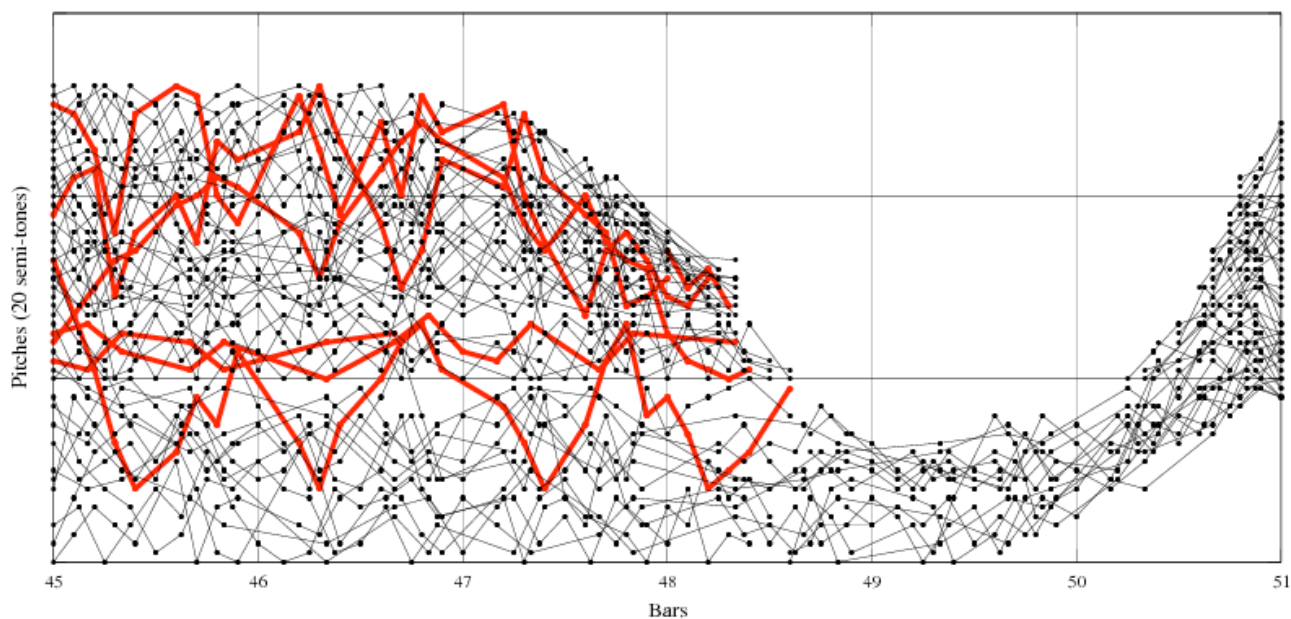


Fig. 14: Graphic Representation of *Pithoprakta*, bars 45-51.

Xenakis reused this material at the beginning of *Aroura* (1971) for twelve strings (Fig. 15, Fig. 16). He filters the mass by extracting five lines from it —those lines are drawn in bold (Fig. 14). But he then modifies them considerably: the “ arraché ” and *fortissimo* sounds are turned into soft *glissandi*; the violins do not follow the same subdivision of the time unit; silences, which in *Pithoprakta* equilibrated the densities of the attacks on the beats, disappear —this equilibrium is not needed with *glissandi*; and finally, the parts of viola (7) and cello (1) are diluted by the choice of some notes that only sketch the melodic contours of the original lines —these notes are encircled (Fig. 16). Certainly

Xenakis wrote this passage with the score of *Pithoprakta* at hand. But he transformed it, changing the density, dynamics and the mode of playing.

Fig. 15: Excerpt from *Aroua*, bars 5-7.

Fig. 16: Excerpt from *Pithoprakta*, bars 45-47.

This type of borrowing underlines the practical purpose of montage techniques, which profit from ready-made lines. It is worth noting the distance between these two pieces: fifteen years. It is, to our knowledge, the longest distance between two pieces using the same material. Most of Xenakis' s borrowings group together pieces written during the same period, which rarely exceeds six years.

CONCLUSION

As did many others, Xenakis borrowed from his own previous works. These self-borrowings are not to be regarded as self-quotations. Xenakis refers to independent sonic entities or textures that exist *outside-time*. When he looks back in his own works, he chooses the sonorities or textures he finds interesting. He acknowledges that some structures produce certain types of sonority and he composes them directly by using montage techniques. The absence of any theoretical constraints reflects a global approach to these textures, in which the elements can be inverted, or permuted, without changing their symbolic meaning. It also confirms the importance of such concepts as sonority, sonic entity or texture. They often constitute the basis for Xenakis' formal conceptions.

Should we recall that at the source of these borrowings stand works sometimes rigorously calculated? The use of self-borrowing usually occurs when Xenakis develops new theoretical ideas. Self-borrowings and theoretical ideas succeeded one another. The whole of Xenakis's self-borrowings traces a sort of genealogy [1]. It establishes links between pieces. From a genetic point of view, this genealogy can prove to be useful. It could explain, in certain cases, the absence of sketches and lead us to earlier works. As for analytical purposes, it could prevent us from having to search for the theoretical basis of a material simply extracted from its original context for its sonic quality.

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