

# META-XENAKIS

NEW PERSPECTIVES ON IANNIS XENAKIS'S LIFE, WORK,  
AND LEGACIES

EDITED BY SHARON KANACH AND PETER NELSON





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# 18. Iannis Xenakis's *Pithoprakta*: A Phenomenological Approach

*Erik Christensen and Lise C. Bjerno*<sup>1</sup>

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## Introduction

The background for the present investigation is the music phenomenology proposed by the musicologists Thomas Clifton (1935–78) and Lawrence Ferrara (b. 1949), and the philosopher Don Ihde (1934–2024). These scholars have developed their theories and practice on the basis of the phenomenological philosophy of Edmund Husserl (1859–1938), Martin Heidegger (1889–1976), and Maurice Merleau-Ponty (1908–61).

Phenomenology is the active investigation of the experienced world, realized by descriptions of the first-person experience and reflections on the process of experience. Phenomenology is not a finished system, but an evolving practice. Thus, phenomenology is a style of thinking, a special type of reflection, and the means of understanding phenomenology is the practical application of phenomenology.<sup>2</sup>

Clifton is the enthusiastic discoverer who has applied phenomenology in a wide range of descriptions of music from Gregorian chant to twentieth-century compositions. He emphasizes that all kinds of sound can be heard as music; that space, time, motion, and feeling are basic constituents of music, and that musical experience is an action of the body.<sup>3</sup>

Ferrara is the pragmatic researcher who, in a phenomenological description of Edgard Varèse's (1883–1965) *Poème électronique* (1957–58), has proposed a procedure that alternates between *Open listening* without deliberate focus, *Music-focused listening* which aims at describing particular musical features, and *Hermeneutical listening* which aims at discovering possible interpretations of the music. It is his predominant interest to uncover meaning, history, and lifeworld in the music.<sup>4</sup>

Ihde is the reflecting philosopher who points out that the aim of music

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<sup>1</sup> A shorter version of the present text was published in Spanish in *Pilacremus* (2022), vol. 6, p. 51–70.

<sup>2</sup> Clifton, 1983; Ihde, 2007.

<sup>3</sup> Clifton, 1983.

<sup>4</sup> Ferrara, 1984.

phenomenology is to reveal unnoticed aspects of the music and to appreciate the richness and complexity of sensory experience. This is achieved by conducting phenomenological variations, that is, varying the listener's focus of attention in multiple ways and performing a succession of listening tasks directed by specific questions. Ihde states that music permeates and engages the experiencing body, and that the unity of the senses is primordial. He distinguishes between a first phenomenology, the phenomenology of essence, structure, and presence based on Husserl, and a second phenomenology, the phenomenology of existence, history, and the hermeneutical based on Heidegger.<sup>5</sup>

The question posed in this chapter is the following: can a phenomenological investigation uncover and describe important aspects of Iannis Xenakis's orchestral work *Pithoprakta* (1955–56)? To aim at answering this question, we have performed a procedure of Experimental Listening, based on the recording of The French Radio Symphony Orchestra conducted by Maurice le Roux, duration 9'45".<sup>6</sup>

### *Pithoprakta*

Xenakis's orchestral work *Pithoprakta* was composed for forty-nine musicians: forty-six divisi strings, two trombones, and one percussionist playing woodblock and xylophone. Hermann Scherchen (1891–1966) conducted the first performance of the work in 1957. We present the outcome of a phenomenological investigation of *Pithoprakta*, encompassing comparatively detailed descriptions and hermeneutical interpretations of the work, including prominent musical features, sonorities, densities and transformations of sound masses. In order to minimize presuppositions and promote unbiased listening, we did not study the score or research on *Pithoprakta* prior to the listening sessions. Subsequently, in a survey of the work, we summarize the macroform and possible emotional interpretations of the music, and include references to the printed score. In addition, we quote texts and statements by Xenakis in order to enable comparisons between our investigation and the composer's intentions. References to selected research widen the perspective of the investigation by pointing out important aspects of Xenakis's music and his personality.

### Experimental Listening

On the basis of the theories and practice proposed by Clifton, Ferrara, and Ihde, the present authors have developed the procedure named *Experimental Listening*: two music professionals listen an unlimited number of times to a piece of music, applying deliberately varied listening strategies, directed by specific questions and tasks. The

5 Ihde, 2007, 2012. For a detailed introduction to music phenomenology, see Christensen (2012).

6 LP recording from 1965 on Chant du monde label (VCS 10030), reissued on CD on the same label in 2001 (LDC 278368).

goal is to provide reliable descriptions and hermeneutical interpretations of the piece.<sup>7</sup> In the progression of listening, we follow the rules for phenomenological investigation proposed by Ihde (2012): 1) Describe, do not explain. 2) Perform phenomenological variations. 3) Regard all experienced phenomena as equally real. 4) Include intersubjective verification.

As a preparation, the first author (EC) listened to *Pithoprakta* fifteen times in order to collect observations, possible questions, and listening tasks, as well as to propose a division of the piece into shorter sections in order to facilitate the process of description. Subsequently, both authors listened multiple times to the separate sections, and occasionally to the whole piece.

Xenakis has divided *Pithoprakta* in four sections, separated by silences. In the following table, we propose a division into subsections, characterized by the predominant features heard at the beginning of a subsection:

Sections	Subsections	
Section 1 (2'14) 0'00–2'14	1a (0'45) Wooden tapping sounds	0'00–0'45
	1b (1'29) Arco strings added	0'45–2'14
Section 2 (2'23) 2'14–4'37	2a (0'16) A myriad of sounds	2'14–2'30
	2b (1'27) A broad belt of sound	2'30–3'57
	2c (0'40) Salient <i>glissandi</i>	3'57–4'37
Section 3 (2'37) 4'37–7'14	3a (1'36) Complex polyphony	4'37–6'13
	3b (1'01) Sharp crack, trombones added	6'13–7'14
Section 4 (2'26) 7'14–9'40	4a (0'17) Brief gestures	7'14–7'31
	4b (0'48) Polyphonic <i>glissandi</i>	7'31–8'19
	4c (1'21) Two sharp cracks, increasing noise	8'19–9'40

Table 18.1 Sections and subsections of *Pithoprakta*.

The timing of a section or a subsection includes the subsequent silence.

<sup>7</sup> Christensen, 2012; Christensen and Bjerno, 2020.

## Method

We conducted three listening sessions on 20 April, 22 April, and 2 May 2022. Each listening session had a duration of four hours. We listened to the whole piece and the sections and subsections multiple times. The first author (EC) planned and guided the progression of listening, and the second author (LCB) provided verbal descriptions and hermeneutical interpretations. EC added occasional comments. The outcome of every single listening was notated by EC and included in an edited summary.

What follows here is a report of the listening sessions, encompassing an initial and a final listening of the whole piece and detailed accounts of music-focused observations and hermeneutical interpretations of the separate sections of the work.

### Initial Listening of the Whole Piece

Open listening without deliberate focus.

A smashing composition, displaying salient differences and contrasts. Powerful sections, quiet sections, organic sections, elegant musical forms. A variety of tempi, different degrees of transparency. A great variety of sounds from tiny drips to booms and roars. Many short sounds and many short fragments of melody and rhythm. Prominent pauses.

The initial wooden sounds set a scene and open a space. Sharp cracks appear throughout the piece. The repeated recognition of the sharp cracks ties the different sections together.

### Summaries of Subsequent Listening, Multiple Times

*Section 1a* (0'45) Wooden tapping sounds 0'00–0'45)

Music-focused: Wooden sounds produced by tapping the stringed instruments with fingertips.

Hermeneutical: The sound of small feet on a wooden floor. Many children enter the scene, run around like playing hide-and-seek. Later, the increasing density of sounds resembles raindrops falling on a wooden roof.

*Section 1b* (1'29) Arco strings added (0'45–2'14)

Music-focused: Non-metric wooden sounds continue as a background. In the foreground, sharp arco strings begin playing brief sections of melodic-rhythmic gestures. Between these sections, the background sounds stand out, with additional *pizzicato* sounds.

Midway in the section the volume rises. Distinctness disappears in a complex powerful sound in motion, including ripping sounds. Four prominent sharp cracks and rumbling sounds lead to a final characteristic cluster chord.

Hermeneutical: The soundscape becomes ominous. Possible foreboding of war. The children take flight. Many people in a market place express statements and dialogues.

[EC: I have not experienced associations to war, but I accept the interpretation.]

*Section 2a* (0'16) A myriad of sounds (2'14–2'30)

Music-focused: A myriad of melodious movements and noises.

Hermeneutical: A multitude of grasshoppers.

*Section 2b* (1'27) A broad belt of sounds (2'30–3'57)

Music-focused: A broad belt of continuous sound at the bottom, rhythmical patterns of clear sounds at the top. Towards the end of the section the continuity disintegrates. After a sharp crack, a kaleidoscopic pattern begins expanding upwards and downwards, accumulating tension which is released in the next section.

Hermeneutical: Background: Lovely continuous sound, gently pulsating or breathing. Foreground: A forest with a woodpecker and bird voices, sounding rather mechanical. Finally, the birds freak out.

An alternative interpretation: A pleasant soft fundament at the bottom. High sounds gather in a continuous stream, like stationary fireworks with glimpses of light, or an electric bell.

*Section 2c* (0'40) Salient *glissandi* (3'57–4'37)

Music-focused: Sudden strong *glissandi* up and down, followed by single-instrument *glissandi* in different registers. *Pizzicati* interact with the *glissandi*. Deep tone at the end.

Hermeneutical: In the last part of the section: Elegant *glissando* gestures and *pizzicati* in playful motion up and down, like a well-timed and well-balanced ballet.

*Section 3a* (1'36) Complex polyphony (4'37–6'13)

Music-focused: A polyphony of many different string sounds. Strings struck with the bow, *pizzicato*, rumbling thick strings, sharp sounds, small fragments of melody and rhythm. Glimpses of regular meter. The basses indicate a tempo from the beginning.<sup>8</sup>

Hermeneutical: Continuous commotion. The rumbling sounds seem scary. War is present or approaching. However, people live and survive in a country that is being bombed. They dance, sing, laugh, and find food.

<sup>8</sup> In the printed score, the composer describes the complex section 3a as a "nebula of sounds, the galactic configurations of '*arco norm.**ff*' [...] must be put in relief." Score measures 122–70, Xenakis, 1956, p. 17.

## Section 3b (1'01) Sharp crack, trombones added

(6'13–7'14)

Music-focused: Salient sound of two sliding trombones on a background of rapid movements of stringed instruments. Gradually, the movements condense in a regular meter and marked rhythms.

Hermeneutical: The sound of threatening airplanes indicates war. Subsequent shooting and the jerks of wounded bodies. After a moment of silence and another brief shooting, the section ends with the sound of tramping boots followed by silence.

[EC: I have no associations to airplanes and a battlefield. I simply hear the sliding sounds of trombones, followed by metric and rhythmic patterns. However, I can understand your experience of war.]

## Section 4a (0'17) Brief gestures

(7'14–7'31)

Music-focused: Metric melodious *pizzicati* followed by sonorous deep sounds and disintegrated toneless *pizzicati*.

Hermeneutical: We both heard this brief section as a comic interlude, like a cartoon or a moment of stand-up comedy: "A group performs a clumsy movement. Met with unanimous mockery, they fumble and stumble." We could not help laughing, presumably as a relief after listening to several serious sections.

Section 4b (0'48) Polyphonic *glissandi*

(7'31–8'19)

Music-focused: A variety of solo *glissandi* and grouped *glissandi* interspersed with *pizzicato* melodies in different tempi and registers on a background of heavy sounds.

Hermeneutical: A beautiful dance. The gliding sounds in this section remind us of the enchanting underwater songs and dances of the seductive females, called Sirens in the Greek mythology.

## Section 4c (1'21) Two sharp cracks, increasing noise

(8'19–9'40)

Music-focused: The gliding movements assemble in a strident multilayered sound mass. In a rising, whirling movement, the sound mass gradually dissolves, leaving sparse piercing sounds.

Hermeneutical: The beautiful music is interrupted by an air-raid alert. People run away and disappear. At the end, merely extremely unpleasant high sounds are left, like glimpses of blinding light. The sounds jar on the ear and cause tortuous bodily feelings, like screeching chalk on a black board or a metal file grating your teeth.

[EC: I can accept your experience of a noisy air-raid alert in this section, but I do not share your feeling of tortuous sounds at the end. At the end I hear thin ephemeral sounds disappearing in open space.]



## Particular Music-focused Listening Tasks

In the course of the investigation described above, we have included specific music-focused listening tasks. Some examples are the following:

### Task: Listen for Different Sonorities

*Section 1a*: The sound of tapping on wood.

*Section 2b*: A field of harmony and timbre sustained by string instruments.

*Section 3b*: Rapidly moving string sounds blend with the sustained interferent sound of trombones.

*Section 4c*: A field of noise ranging from diffuse deep sounds to sharp high sounds.

### Task: Listen for Musical Transformations

*Section 1b*: In the strings, the mode of playing gradually changes from mixed tapping, *pizzicato* and arco playing to complete dominance of arco playing.

*Section 2c*: Massive multiple *glissandi* dissolve into transparent single *glissandi*.

*Section 3b*: Non-metric sound is transformed into regular meter.

*Section 4c*: A field of noise in motion is transformed into massive sustained noise which subsequently dissolves into ascending whirling motion.

## Final Listening of the Whole Piece

We rounded off the sessions with a music-focused listening of the entire piece, performing the following task: describe the density or transparency of sound in each section.

*Section 1a* (0'45) Wooden tapping sounds

Transparent at the beginning. Groups of sounds appear gradually. The density of sounds increases, like raindrops. However, a certain degree of transparency remains, the view is not blocked.

*Section 1b* (1'29) Arco strings added

Variable layers of foreground and background. A rather dense layer of wooden sounds in the low register. Pauses permit the experience of an open view. Towards the end of the section, the density increases to impenetrability.

*Section 2a (0'16) A myriad of sounds*

Three layers: Low, middle and high sounds. Rather massive at the bottom. The top layer of sounds resembles a scrub which you can look through.

*Section 2b (1'27) A broad belt of sound*

The continuous sound constitutes a rather transparent background, like a mist.

*Section 2c (0'40) Salient glissandi*

Beginning: Rather dense sound, like broad brushstrokes. End: Extremely transparent.

*Section 3a (1'36) Complex polyphony*

Not massive. A swarm of varied sounds, glimpses of transparence. Blurred sound at the bottom.

*Section 3b (1'01) Sharp crack, trombones added*

Beginning: Two layers: Dense sound of trombones, transparent sound above.

Middle: *Pizzicati* clear the space, opening a free view.

End: Long pauses of silence, plenty of empty space.

*Section 4a (0'17) Brief gestures*

Salient quasi-melodic *pizzicati* and heavy bass sounds in an open space, followed by scattered *pizzicati* which disappear.

*Section 4b (0'48) Polyphonic glissandi*

A continuous layer of sound of variable density. The layer is not thick, but constantly blurred.

*Section 4c (1'21) Two sharp cracks, increasing noise*

Beginning: Massive noise, gradually changing towards transparence.

End: Sharp high sounds in a completely transparent space.

## Comments on the Descriptions and Interpretations

In order to underpin unbiased perception and description as far as possible, we did not study the score or research on *Pithoprakta* before the listening sessions. Subsequently, we have compared our descriptions and interpretations with the printed score and related research.

Our listening was sometimes "open" without deliberate focus, sometimes guided by specific questions or tasks. It is our experience that the alternation between open

and focused listening is rewarding. Multiple listening of the separate sections resulted in music-focused as well as hermeneutical descriptions.

Hermeneutical listening includes emotional and aesthetic responses, and the hermeneutical interpretations are related to the listener's personal knowledge, lifeworld, and previous experience. It is conspicuous that LCB was inclined to interpret the sounds of certain sections as ominous, threatening, or warlike, while EC more hesitantly accepted associations to war and battlefields. The listening sessions took place in the spring of 2022 while war between Ukraine and Russia was ongoing, so associations to warlike sceneries were obvious and likely. We consider associations to war relevant, as it is well-known that Xenakis experienced alarming events of resistance and battles in Greece during World War II, when his face was wounded, and he barely survived. Xenakis mentions these circumstances in his comments on musical creation, quoted below.

We find that the variety of structure and aesthetic expression in *Pithoprakta* is admirable, ranging from clarity and simplicity to complexity and ambiguity, and from beauty and elegance to massive noise. In the hermeneutical listening of *Pithoprakta*, we experience a variety of emotional impact, ranging from pleasure, delight and enchantment to anxiety, alarm and tortuous bodily feelings.

We can briefly summarize our music-focused descriptions and emotional interpretations of the subsections of *Pithoprakta* in the following overview, with indication of the corresponding score measures:

Duration	Brief music-focused description	Brief emotional interpretation	Measures
1a (0'45)	Wooden tapping sounds	Pleasant	1–16
1b (1'29)	Arco strings added	Ambiguous	17–51
2a (0'16)	A myriad of sounds	Lively	52–9
2b (1'27)	A broad belt of sound	Lovely	60–104
2c (0'40)	Salient <i>glissandi</i>	Elegant	105–21
3a (1'36)	Complex polyphony	Ambiguous	122–70
3b (1'01)	Trombones added	Threatening	171–99
4a (0'17)	Brief gestures	Surprising	200–7
4b (0'48)	Polyphonic <i>glissandi</i>	Beautiful	208–30
4c (1'21)	Increasing noise	Alarming	231–67

Table 18.2 Overview of *Pithoprakta*.

In the score, the four sections are clearly separated by silent bars. According to our investigation, each of the sections displays a distinct character: Section one displays a contrast between simple wooden sounds and complex mixed sounds. Section two is predominantly pleasant. Section three is predominantly serious. In section four, beauty is disturbed by alarm.

It seems relevant to point out that Xenakis would not have accepted this kind of description. He energetically refused to discuss any emotional impact of his music, as recalled by Bálint András Varga (1941–2019) in his conversations with Xenakis.<sup>9</sup>

### Xenakis Describes *Pithoprakta*

Here, we quote texts by Xenakis, and an excerpt of an interview in order to enable comparisons between our phenomenological description and the composer's own statements. Xenakis has provided this introduction for the 1965 recording:

*Pithoprakta* (Actions through probabilities).

Written in 1955–56 and dedicated to Hermann Scherchen who conducted its first performance in March 1957 at the Musica Viva concerts in Munich, the work is scored for 50 instruments: 46 strings, 2 trombones, 1 xylophone, 1 woodblock. The author, using the findings of probability theory, is seeking a confrontation here between continuity and discontinuity through *glissandi* and *pizzicati*, tapping with the wood of the bow (*col legno*), or very short bow strokes, as well as striking with the hand the resonator of the stringed instruments, which are divided to the maximum. This is an approach towards “stochastic” (probabilistic) music. With the *glissandi* which can (visually) be assimilated with straight lines, volumes of sound are created which are in constant fluctuation. With a large quantity of isolated sounds spread across the whole sound spectrum, a dense “granular effect” emerges, a real cloud of moving sound material, governed by the laws of large numbers (Laplace-Gauss, Maxwell-Boltzmann, Poisson, Pearson. Fischer). Thus, the individual sound loses its importance to the benefit of the whole, perceived as a block, in its totality. The author's ambition is thus to discover a new “morphology” of sound, fascinating both in its abstract (probabilistic theory) and concrete (sensation of hitherto unknown materials) aspects.<sup>10</sup>

This distinct and informative introduction to *Pithoprakta* accentuates salient musical features and the underlying theory of composition. The composer's statements add precision and theoretical perspectives to our music-focused observations. Characteristically, Xenakis does not include considerations of aesthetics or musical form. In the following quotation from his book *Formalized Music*, Xenakis relates his striking observations of mass events in nature and society, which urged him to invent a completely new kind of music:

<sup>9</sup> Varga, 1996, p. 137–8.

<sup>10</sup> Xenakis, 1965, reissue in CD booklet from 2001.

I originated in 1954 a music constructed from the principle of indeterminism; two years later I named it "Stochastic Music." The laws of the calculus of probabilities entered composition through musical necessity.

But other paths also led to the same stochastic crossroads—first of all, natural events such as the collision of hail or rain with hard surfaces, or the song of cicadas in a summer field. These sonic events are made out of thousands of isolated sounds; this multitude of sounds, seen as a totality, is a new sonic event. This mass event is articulated and forms a plastic mold of time, which itself follows aleatory and stochastic laws. If one then wishes to form a large mass of point-notes, such as string *pizzicati*, one must know these mathematical laws, which, in any case, are no more than a tight and concise expression of chain of logical reasoning. Everyone has observed the sonic phenomena of a political crowd of dozens or thousands of people. The human river shouts a slogan in a uniform rhythm. Then another slogan springs from the head of the demonstration; it spreads towards the tail, replacing the first. A wave of transition thus passes from the head to the tail. The clamor fills the city and the inhibiting force of voice and rhythm reaches a climax. It is an event of great power and beauty in its ferocity. Then the impact between the demonstrators and the enemy occurs. The perfect rhythm of the last slogan breaks up in a huge cluster of chaotic shouts, which also spreads to the tail. Imagine, in addition, the reports of dozens of machine guns and the whistle of bullets adding their punctuations to this total disorder. The crowd is then rapidly dispersed, and after sonic and visual hell follows a detonating calm, full of despair, dust, and death. The statistical laws of these events, separated from their political or moral context, are the same as those of the cicadas or the rain. They are the laws of the passage from complete order to total disorder in a continuous or explosive manner. They are stochastic laws.<sup>11</sup>

This text provides an important background for understanding the composer's intention of composing sound masses and transformations from continuity to discontinuity and from order to chaos. Furthermore, Xenakis refers to his experience of dramatic demonstrations and violent conflicts. It is well-known that when Xenakis participated in political demonstrations in Athens, he was wounded in his face by shrapnel, he lost an eye and barely survived. The references to warlike events in our phenomenological report are spontaneous, not directly related to this text, but Xenakis's statements strengthen the credibility of interpreting sections of *Pithoprakta* as threatening or harrowing.

In Varga's *Conversations with Iannis Xenakis*, the composer emphasises that creative intuition is more important for him than theory and calculation:

Xenakis: *Pithoprakta* is a jump into the unknown. I was guided only by my ideas about its macroform. And by the time I had written it I became conscious of the musical aspects of my experiences with nature and mass demonstrations which appeared rather unconsciously in *Metastasis*.

Varga: For the listener the most immediate impression given by *Pithoprakta* is the

11 Xenakis, 1992, p. 8–9. Supplement: Xenakis has presented an introduction to probability and music in an interview in English with German subtitles. See Andrew Toovey, "Iannis Xenakis (1 of 2) Filmed Interview in English with German Subtitles" (28 October 2010), *YouTube*, <https://www.youtube.com/watch?v=j4nj2nklbts>

presence of sound effects: the special ways of playing on the bodies of string instruments.

Xenakis: Yes. And it's not difficult to explain why I used them. I wrote *Pithoprakta* primarily for strings because it's easier to produce mass events and various timbres with them than with many other instruments. I also needed percussion effects. Instead of calling for a great many percussion players, which would have entailed organizational and other difficulties, I used the body of the instruments. It was that noise—the cloud of percussive sounds—that I transformed gradually, using statistical methods, into musical sounds. It's like dissolving one picture into another in film technique.<sup>12</sup>

[...]

Scientific thought is only a means with which to realise my ideas, which are not of scientific origin. These ideas are born of intuition, some kind of vision.<sup>13</sup>

In his book *Musique. Architecture*, Xenakis states that “[...] At the end of the day, instinct and subjective choice are the only guarantees of the value of a work.”<sup>14</sup>

## The Relationship between Mathematical Calculations and Music

Xenakis's applications of mathematical calculations to construct a large variety of sound masses in *Pithoprakta* are omnipresent and conspicuous. However, it seems that his use of calculations was a generative tool, not a goal. As he writes:

The composition I have written (*Pithoprakta*) existed in me before studying mathematics, which has only permitted a clearer, more precise formulation. [...] My work *Pithoprakta* is not entirely built with the probabilities.<sup>15</sup>

I wrote *Pithoprakta* [1955–6, for orchestra], which was based mostly on probabilities. For months I tried to understand what it could mean. I was reading books on agronomy and the applications of probabilities in biology. I was trying to understand how I could use this tool [probabilities] in order to shape the sound output. Months—trying to imagine the results.<sup>16</sup>

Xenakis possessed knowledge of different theories of probability and the corresponding statistical method. As such he was able to choose between these methods in order to calculate and create sound masses that display a variety of structures, sonorities, densities and transformations. Thus, the mathematical calculations contributed to realizing Xenakis's intuitive vision of the macroform and variability of *Pithoprakta*.

12 Xenakis, in Varga, 1996, p. 75.

13 Ibid, p. 47.

14 Xenakis, 1976, p. 19 “[...] *En définitive, l’instinct et le choix subjectif sont les seuls garants de la valeur d’une œuvre*] (our translation).

15 Letter to the conductor Hermann Scherchen 1956, in Xenakis, 1994, p. 44–5 [*La composition que j’ai écrite (Pithoprakta) existait en moi avant l’étude mathématique, qui a seulement permis une formulation plus précise [...] Mon œuvre Pithoprakta n’est pas bâtie entièrement avec les probabilités*].

16 Interview with Xenakis 1990, reported in Kanach, 2012, p. 22.

## Related Research

### Analytical Descriptions

Two authors have provided detailed score analyses of *Pithoprakta*: Nouritza Matossian<sup>17</sup> and Makis Solomos, who concludes that “*Pithoprakta* constitutes a model of the diverse techniques applied to particular sections and affecting either particular characteristics of the sound (register, density, spatial movement, ‘filtering’, etc.) or the sound state in its overall nature.”<sup>18</sup> The following survey permits comparison of our overview in the above Table 18.2 with the two scholars’ respective characterizations. In this survey, some of Matossian’s statements are abbreviated.

1a (0’45)	Wooden tapping sounds	Pleasant	measures 1–16
Matossian (M): <i>Pithoprakta</i> opens with soft tufts of woody tapping as string players strike the body of their instruments with their hands.			
1b (1’29)	Arco strings added	Ambiguous	measures 17–51
Solomos (S): Noises with continuous transformation of density and spatialization and progressive emergence of <i>pizzicato</i> and <i>arco</i> (measures 0–51).  M: Line, breadth and horizontality are established by rhythmic arpeggio-like bowing from two instruments. Others bow the four and five-note groups which overlap one another so that the rhythmic groups chase after each other.			
2a (0’16)	A myriad of sounds	Lively	measures 52–9
S: Overall transformation through “filtering” of a “cloud of sounds” (measures 52–9)  M: Now, however, there is a sudden cloud of <i>pizzicato</i> appearing without warning. The instruments move up and down the chromatic scale at independent rhythms and pitches wandering across the registers, changing to <i>pizzicato-glissandi</i> .			
2b (1’27)	A broad belt of sound	Lovely	measures 60–104
S: <i>Tenuti</i> with progressive emergence of <i>pizzicato</i> then <i>glissandi</i> (measures 60–104).  M: These freely moving points are marshalled into straight lines (bar 60) as each one freezes on a pitch and sustains it so that the whole chromatic scale is covered, sounding like a gigantic organ cluster.			
2c (0’40)	Salient <i>glissandi</i>	Elegant	measures 105–21
S: Discontinuous transformations of a field of <i>glissandi</i> (measures 105–21).			

<sup>17</sup> Matossian, 1986, p. 95–99.

<sup>18</sup> Solomos, 2020, p. 177.

M: Soon three strings in groups of three are simultaneously drawing sharp *glissandi*. Joined in pairs one string plays a *pizzicato* on a pitch while his neighbour bows the same pitch, then dives off on a *glissando* away from it. The sharp overlapping diagonals have a spring and buoyancy as they scatter delicately in space, describing steep trajectories in elegant isolation.

3a (1'36)      Complex polyphony      Ambiguous      measures 122–70

S: *Bruitteux* superposition of six timbre groups with sporadic “views under the microscope” (measures 122–71).

M: After a silence (bar 122) it is as though the insect kingdom were at war. There is a buzzing, whirring, droning, humming, shot through with pointed screams.

3b (1'01)      Trombones added      Threatening      measures 171–99

S: Continuous transformation of the register of sounds in *battuto col legno* (measures 172–79). Discontinuous transformations through “filtering” of a cluster (measures 180–207)

M: The two trombones enter with a tight, pianissimo *glissando* while a punctuated *col legno frappé* reincarnates into periodic *pizzicato*.

4a (0'17)      Brief gestures      Surprising      measures 200–07

M: After a brief silence some *pizzicato* lighten the timbre as ephemeral *glissandi* climb gently up and down the register, finally building up to a forte. They are rapidly scattered by the tapping bows.

4b (0'48)      Polyphonic *glissandi*      Beautiful      measures 208–30

S: Fields of *glissandi* with irregular then linear transformation of register (measures 208–31)

M: The *glissando* once more regains its hold but is gradually absorbed into horizontals, as at the beginning of the work, with sustained pitches.

4c (1'21)      Increasing noise      Alarming      measures 231–67

S: Large cluster that “evaporates” progressively in the high register (measures 231–50). Harmonics in discontinuous spatial transformations (measures 250–68).

M: The zigzags slowly straighten out with furious opposition from the violent bowing of the basses. The sustained notes persevere, then veer off into excited *glissandi* which thin out over the next five bars. The piece ends with querulous violins reiterating a high scraping *B-flat*.

Table 18.3 Comparative analytical descriptions of *Pithoprakta* by N. Matossian and M. Solomos.



As regards the division in sections, the survey indicates considerable coincidence between the phenomenological investigation and the two scholars' descriptions. Solomos provides short, precise analytical characterizations of each section, while Matossian presents more elaborate descriptions.

As regards emotional reactions and hermeneutical interpretations, it is obvious that these constitute a prominent part of our report, but are scarce in the above quotations of Matossian and Solomos. However, Matossian includes interpretative imagery in section 2c: "The sharp overlapping diagonals have a spring and buoyancy as they scatter delicately in space, describing steep trajectories in elegant isolation," and section 3a: "it is as though the insect kingdom were at war. There is a buzzing, whirring, droning, humming, shot through with pointed screams." In the final section 4c, an emotional impact is reported: "The piece ends with querulous violins reiterating a high scraping *B flat*."<sup>19</sup>

## Composed Sonorities

In his book *From Music to Sound*, Makis Solomos clarifies essential aspects of Xenakis's music.<sup>20</sup> He points out that for Xenakis, sound is not a neutral material, but the very foundation of music. Xenakis does not treat sound as a starting point of composition, but as a goal of the composition process. He creates sound masses, textures and surfaces by means of sound synthesis procedures, comparable to the work of a sculptor. His composition processes permit continuous variation and goal-directed transformations.

In continuation of the descriptions quoted in the above survey, Nouritza Matossian has provided a comprehensive discussion of timbres, articulations, instrumental interplay and polyphony, spatialization, timing and proportions in *Pithoprakta*.<sup>21</sup> Matossian states, like Solomos, that it was Xenakis's intention to create vast and open musical spaces, rendering transformations by gradual change perceptible. She indicates his application of probability distributions and generative mathematical functions, but points out that "Xenakis never claimed that a rigorous mathematical or analytic basis is sufficient to produce a well-formed piece of music."<sup>22</sup>

## The Qualitative Impact of Music on the Listener

In the above-mentioned book, Makis Solomos points out that Xenakis introduces a dichotomy between quantitative and qualitative aspects of music, quoting an early article by Xenakis that discusses a possible connection between different types of music:

<sup>19</sup> Matossian, 1986, p. 99.

<sup>20</sup> Solomos, 2020, p. 170–77.

<sup>21</sup> Matossian, 1986, p. 99–107.

<sup>22</sup> *Ibid.*, p. 106.

The connection exists. It is the very foundation, the content of sound and the musical art that uses it. [...] Sound in acoustics is analysed in physical-mathematical equations (it is an elastic vibration of matter), which are measured: intensity, colour, time. [...] But as soon as the threshold of the ear is crossed, it becomes impression, sense, and consequently qualitative size.<sup>23</sup>

Solomos comments that the qualitative aspect remains rather imprecise in Xenakis's remark, while the quantitative aspect of sound is quite clearly delimited. At any rate, Xenakis considers it relevant that sound induces a sensory impact on the listener.

Solomos mentions the listener's possible sensory impressions in his chapter on immersion in sound: "In *Pithoprakta* (1955–56) the strings play up to 46 real parts, forming gigantic overall sounds in which the listener is invited to immerse himself or herself to observe its inner life."<sup>24</sup>

Another indication of the listener's possible perception of Xenakis's continuous sonorities stands out in Solomos's quotation of the French composer and musicologist Francis Bayer (1938–2004):

The particular power that is given off by musical works that swear allegiance to this aesthetic of continuity, stems, it seems to us, from the fact that their significance, since it is immanent to the sensitive, immediately imposes itself on us in favour of a sort of wild perception of our whole body, prior to any analytical approach to our understanding.<sup>25</sup>

In his description of *Pithoprakta*, Solomos provides explanations of the technical and quantitative aspects of the work, but he does not focus explicitly on the qualitative aspects of music, pointed out as "impression" and "sense" by Xenakis. However, Solomos discreetly draws attention to these aspects by mentioning immersion in music and bodily perception.

We consider phenomenological investigations important for clarifying the qualitative aspects of music, including potential emotional impact, evoked imagery and hermeneutical interpretations. In addition to focusing deliberately on specific musical features, we have profited from "immersing ourselves" in the sounds of *Pithoprakta* and experiencing "the wild perception of our whole body," as pointed out above by Bayer.

## Drama, Noise, and Concealment

The Mexican composer Julio Estrada (b. 1943) attended Xenakis's lectures at The Schola Cantorum in Paris in 1967–68. They became friends and maintained a friendship for more than thirty years, discussing, sharing memories, collaborating and travelling

23 Xenakis, [1955] 2001, "Problèmes de composition musicale grecque," p. 12, in Solomos, 2020, p. 173. Solomos's excerpt and translation.

24 Solomos, 2020, p. 114, 172.

25 Bayer, 1981, p. 132. Solomos's translation.

together in France and Mexico. For Estrada, Xenakis was not a teacher, but a beneficent influence during his formative period, a fascinating source of knowledge, insight and methods, with a permanent stimulus toward scientific study.<sup>26</sup>

In the article “Music, Science, Architecture: Pythagorean Wall of the Drama,”<sup>27</sup> Estrada presents a description of *Pithoprakta*, which refers to the events known as “dekemvriana,” the violent clashes fought in Athens in December 1944 and January 1945, as well as referring to Xenakis's own text about the sound of crowds in demonstrations (1992, p. 8–9):

With Greek rhythm, *pizzicato* and *glissandi* as evocation of noise, Xenakis resolves to turn the dense anarchy of the dekemvriana into orchestral music: *Pithoprakta*, shouting slogans in the front row reappearing in the back rows; student shouting and clapping make up the core of the work, a disorder with a direction. [...] *Pithoprakta*'s noises are visualized with a web of gliding pitches, movement that seems to lead the masses through streets and squares if one follows the chronographic account, advancing in groups from left to right, scattering treble above, and bass below, with a gap in the center separating both masses. The title, from the Greek “random actions,” evokes the stochastic method–conjecture or directed probability—that the author associates with the idea of mass, useful to fill the space occupied by the collective movement of the manifestation, partially expressed as a sequence advancing with pitch *glissando* in zigzag.<sup>28</sup>

This short description and interpretation of the sound masses in *Pithoprakta* is directly related to the violent “dekemvriana” in Athens. It is well-known that during a conflict, Xenakis was hit by shrapnel and was very seriously injured, losing an eye and receiving other facial wounds. Moreover, Estrada relates a confidential revelation by Xenakis that “for a decade, he hears uninterruptedly a complex noise caused by the deterioration of the auditory system.”<sup>29</sup> Estrada suggests that Xenakis's auditory ailment has urged him to expose noise in his music<sup>30</sup> and to conceal aspects of his personality and composition process.

The production or adaptation of various kinds of noise is evident in *Pithoprakta* and other works of Xenakis. Solomos describes fifteen types of noise in *Diamorphoses* (1957) for tape, based on recorded sounds of noisy character.<sup>31</sup> He furthermore refers to a text by the Czech author Milan Kundera (1929–2023), who wrote that “the world of noises in Xenakis's compositions became, for me, *beauty*.”<sup>32</sup>

26 Estrada, 2001.

27 Estrada, 2022, p. 199–221 “Música, ciencia, arquitectura: muro pitagórico del drama.” Our translation. See also Estrada's chapters in this volume (Chapters 27 and 28).

28 Estrada, 2022, p. 205–06. Estrada's translation, kindly communicated by the author. All translations of the 2022 text are Estrada's, unless otherwise specified.

29 Estrada, 2022, p. 200 [*durante una década, oye ininterrumpidamente un ruido complejo provocado por el deterioro del sistema auditivo*].

30 Estrada, 2001, p. 216.

31 Solomos, 2020, p. 65.

32 Kundera, 1981, p. 24 [*le monde des bruits dans les compositions de Xenakis est devenu pour moi beauté*]. Translated in Solomos, 2020, p. 82.

Estrada supposes that it was Xenakis's intention to share his own disturbing experience of continuous noise with the music listener. He remembers a concert performance in Paris of *Bohor* (1962) for tape, a twenty-minute work that gradually advances towards extremely noisy chaos, where Xenakis personally set the volume at maximum amplitude.<sup>33</sup> Xenakis has commented in an interview that listening to *Bohor* implies that sound penetrates the ear: "In order to hear all these minimal details of sonority, I had the feeling that more volume was necessary."<sup>34</sup>

The "Pythagorean wall" in the title of Estrada's article refers to a myth in which the ancient Greek mathematician Pythagoras hid himself and talked behind a wall. Likewise, Estrada suggests that Xenakis hid himself in various ways. In particular, Estrada critically characterizes Xenakis's elaborate mathematical explanations as a kind of wall to hide behind: 'the priority he gives to his theoretical-constructive rationalism serves to keep the spectator at an intellectual distance.'<sup>35</sup> Moreover, Estrada relates significant memories of Xenakis's classes in The Schola Cantorum. When Estrada once asked about details of the dodecaphonic series in the middle section of *Metastasis*, Xenakis briefly answered "mere coincidence."<sup>36</sup> When he on another occasion asked how Xenakis in his stochastic model proceeded to convert numbers into notes, Xenakis became very angry and refused to answer. "[He] would not make the slightest concession that dealt with explaining procedures that, even if they were simple, he would still jealously keep private."<sup>37</sup>

Estrada has communicated these memories to express his empathy and point out that Xenakis converted his ailment into a strong driving force in his creative processes. He concludes, addressing Xenakis: "your example has left something formidable, fundamental, that deserves to be remembered here: to believe and to create according to one's own light."<sup>38</sup>

Estrada has presented personal knowledge of Xenakis's life, his tinnitus-like auditory ailment and his reactions to unwelcome questions. This adds perspective to our report of warlike associations and emotional reactions to noise in *Pithoprakta*, as well as a background for understanding the composer's insistence on keeping certain aspects of his creative process private.

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33 Estrada, 2022, p. 216. See also Chapter 28 in this volume.

34 Xenakis in Delalande, 1997, p. 138 [*Pour entendre tous ces minimes details de sonorités, j'avais la sensation qu'il fallait plus de volume*]. Authors' translation.

35 Estrada, 2022, p. 210: [*la prioridad otorgada al racionalismo teórico-constructivo sirve para mantener a distancia intelectual al espectador*].

36 Ibid., p. 203 [*pura coincidencia*].

37 Estrada, 2001, p. 219.

38 Ibid., p. 227.

## Limitations

We consider the outcome of the present investigation to be a description and interpretation of *Pithoprakta* that is representative, but not exhaustive. We have listened for the characteristic features of sound as well as the sonorities, transformations and densities of sound masses. Each of these fields could be described in more detail, in particular the sonorities and transformations. Furthermore, it would be possible to continue the investigation by conducting supplementary listening tasks, such as listening for foreground and background, registers, layers, and surfaces of sound, brightness and darkness, tension and directionality.

The music-focused descriptions are summaries of multiple detailed observations provided by LCB, notated and subsequently edited by EC and finally commented by LCB. This process implies intersubjective verification, so that the music-focused descriptions represent the consensus of both authors.

On the other hand, hermeneutical interpretations may not imply a consensus. They are influenced by the listener's personality, background, experience, history, and context. Throughout our listening sessions, we noticed individual differences in the experience of potentially threatening, warlike, and disturbing sounds. We consider such differences inevitable and valuable, and have briefly commented on our different experiences. We suggest that it is important to respect variability and disagreement in the experience and interpretation of music.

The recording of *Pithoprakta* by The French Radio Symphony Orchestra conducted by Maurice le Roux is the basis of our investigation, and we consider it the original version of the work. Other recordings of this work display marked differences in tempo, sound, volume, timbre, balance and phrasing. It is likely that investigations of these recordings may result in considerable differences in music-focused descriptions as well as hermeneutical interpretations. To facilitate comparisons, we include links to four different recordings below (see Links to Online Recordings).

## Concluding Remarks

We have conducted the phenomenological investigation of *Pithoprakta* in order to attract attention to an approach to Xenakis's music which constitutes a supplement to the analytical, theoretical and mathematical descriptions and explanations of his works. The present text introduces an example of Experimental Listening, which we regard as a rewarding procedure for approaching, discovering, and assimilating a complex musical work. We consider hermeneutic interpretations and descriptions of emotional impact relevant for the study of Xenakis's works, even if this may provoke the discontent of some researchers. Xenakis would certainly not have approved of this kind of research, even though he was aware that "as soon as the threshold of the ear is crossed, [sound] becomes impression, sense, and consequently qualitative size."

With reference to the scholars of music phenomenology mentioned in our introduction, it is our estimation that we have followed Ihde's guidance, that the aim of music phenomenology is to reveal unnoticed aspects of the music and to appreciate the richness and complexity of sensory experience. Furthermore, we agree with Clifton's point of view that all kinds of sound can be heard as music; that space, time, motion, and feeling are basic constituents of music, and that musical experience is an action of the body. From Ferrara's research we have adopted the practice of open, music-focused and hermeneutical listening, and the opinion that it is important to uncover meaning in music. We have not followed Ferrara's incentive to uncover history and lifeworld in music, but we consider these fields amply researched by Xenakis scholars.

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## Links to Online Recordings

- The French Radio Symphony Orchestra conducted by Maurice Le Roux (1965), duration 9'45, *Le Chant du Monde* LDX-A-8368. With score display: see *Pour ceux que le langage a désertés*, "Iannis Xenakis - Pithoprakta (1955–56) pour 49 musiciens" (25 September 2020), <https://www.youtube.com/watch?v=yxAKHDWjrw>
- Luxembourg Philharmonic Orchestra conducted by Arturo Tamayo (2008), duration 10'30, *Xenakis: Orchestral Works Vol. 5*, Timpani 1C1113. With graphic score animation: see Pierre Carré, "Iannis Xenakis - Pithoprakta (w/ graphical score)" (30 April 2017), *YouTube*, <https://www.youtube.com/watch?v=nvH2KYYJg-o>
- New York Philharmonic Orchestra conducted by Leonard Bernstein (1964), duration 8'30. With an introduction by Leonard Bernstein: see goodmanmusica, "Xenakis Pithoprakta - Bernstein / NYP (1964)" (29 July 2019), *YouTube*, <https://www.youtube.com/watch?v=LfH74hKhKp0>
- Buffalo Philharmonic Orchestra conducted by Lukas Foss (1968), duration 8'30. See: Wellesz Opus, "Iannis Xenakis: Pithoprakta (1955/1956)" (1 March 2015), *YouTube*, <https://www.youtube.com/watch?v=AE1M2iwjTsM>

