# Iannis Xenakis' SIX-XEN. A new instrument for *Pléïades* (1978) and a creative process with Indonesian references

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## Dedication

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I would like to dedicate this work to **Sarah Brabo-Durand** who accompanied me in such difficult moments, always believing that it could be possible, even when I did not.
I also dedicate it to all my family, especially my grandfather **Gildas Bernier**, who carried me to my first field research projects during his archaeological expeditions when I was just a dreaming boy.

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Archives contacted for online consultation that were also fundamental: *Institut national de l'audiovisuel* (INA), *Opéra National du Rhin* archives, Polish Music Information Centre (POLMIC), *Internationales Musikinstitut Darmstadt* (IMD), New Music Concerts (NMC), Archaeology of the Final Decade, *Ksyme* Archives (CMRC), *Taormina Arte Sicilia Fondazione, Centre Iannis Xenakis* (CIX), Leiden University Libraries, and the Marine Corps Archives and Special Collections (MCASC).
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# Abstract

The present text addresses the interests, motivations, creative connections, and performative possibilities that an innovative instrument created by a composer for a specific piece could stimulate. Specifically speaking, Iannis Xenakis (1922-2001) conceived in 1978 the SIX-XEN as a metallic instrument to be used in two of four movements of *Pléïades*, a percussion sextet dedicated to Les Percussions de Strasbourg (France). The concept initially demanded the composer's involvement in the achievement of its practical construction, and different prototypes appeared in the following years. In the introductory presentation of the piece, the composer mentioned that some correlation with Indonesian music could be perceived in the formal structures.

Part I presents an historical perspective to discuss multiple initial aspects of this complex issue. Chapter 1 addresses the context in which Indonesian musical traditions permeated Xenakis' life. In this context a more detailed description about his unique trip to Bali and Java is delineated. This 1972-1973 journey through the islands in Southeast Asia impacted significant aspects of the composer's thinking, approaches, tools and practices, having important impacts and direct consequences in the piece and instrument here addressed. Chapter 2 discusses the initial commission that inspired the composer and *Pléïades'* production period when it premiered as a ballet and as an instrumental version. Chapter 3 discusses the definition of the SIX-XEN following Xenakis' indications (in manuscripts, different scores published, interviews and posterior exchanges) and the correlations that the instrument presents with other aspects of the Xenakian compositional approaches. Finally, Chapter 4 discusses the different contexts in which the composer used his instrument, including in another piece than *Pléïades*. Part I is centered on the composer, his personal intents and interests towards the piece and the innovative instrument, as well as his thoughts about the production of instruments (industrial or artisanal), and the performer's participation in improving musical objects. The discussion attests that the openness of the instrument construction is not trivial and that its main characteristics are directly correlated with several of Xenakis' main compositional approaches, intensively reflecting his general work and concepts.

Part II addresses the formal analysis of the piece and clarifies how the Indonesian aspects previously mentioned are connected to Xenakis' creative process, *Pléïades,* and the SIX-XEN. Chapter 5 discusses initial aspects, definitions, and clarifications about the structural elements, while Chapter 6 addresses the four movements of *Pléïades*. Chapter 7 highlights the direct and indirect elements that connect the piece and the Xenakian instrument to Indonesian artistic traditions. This second part of the text attests that a flux of direct exogenous materials from Indonesia entered Xenakis' creative process, something very rarely found in his production. In this way, the fact that he used specific recordings (even one that the composer produced in Bali) to create fundamental structures in *Pléïades* is considerable. The composer's creative process is thus situated in a context not previously addressed, which still deserves more attention. The presented contributions also inspire a review of Xenakis' production in the second half of the 1970s and the first half of the 1980s. This review could bring more data about the intensity of the connections that Indonesian performative arts established in Xenakis' pieces and new tools to analyze and understand his work. In this way, the innovative instrument called SIX-XEN was necessary for Xenakis to have similar timbres of the gamelan in his own compositional context. The fact that the construction of this instrument is required to perform *Pléïades,* puts the musicians in a very important place of decision. The performers' choices are crucial in the timbre results of the piece.

Part III is divided in two to address the performance as the center of this issue: the written section (Chapter 8) and the recordings of the practice produced in four concerts during the present research (all accessible online). The written part focus on the interpretative aspects of *Pléïades* open to the performers' decisions, as well as the Indonesian aspects that could guide the construction of a Sixxen, the interpretation of the piece, or the constitution of a repertoire representing a dialogue between Xenakis and his interests in Balinese and Javanese performative arts. This third part ends with a presentation of the artistic research developed and how it dialogued directly with the archival research and the analysis in continuous information feedback.

Part IV centers on the SIX-XEN and the percussion community that, over the years, has managed to produce a diverse panorama of the potential manifestations of Xenakis' initial idea. In this perspective, Chapter 9 provides a historical description of the percussion ensembles that, having contacted Xenakis or not, successively constructed a Sixxen. In contrast, Chapter 10 presents the main characteristics of the instrument implemented by different percussion ensembles and a general overview of the distribution of Sixxens all around the globe. Chapter 11 discusses the consequential repertoire developed for the Xenakian instrument and the recordings in which it can be heard. This final part attests to an important contribution of the percussion community to the universe of sound research in Xenakis' work. By searching for ways to build a Sixxen to perform *Pléïades* and by commissioning new pieces to this instrument, the percussionists acted as fundamental agents of implementing the composer's musical object.

Xenakis left an acoustic instrument to posterity at the same time that he left it under the percussion community's responsibility (in terms of its construction, use, establishment, and perenniality in the repertoire). The present text is just an initial description of a process that will continue to challenge performers and researchers.

**Keywords:** Iannis Xenakis; Pléïades; sixxen; percussion; Indonesian music.

# Summary

# List of Abbreviations and Terms

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## Abbreviations

AOTFD – Archaeology of the Final Decade
© AOTFD – copyright by Archaeology of the Final Decade
Arb. – arborescence
BLGF – *Bibliothèque musicale La Grange-Fleuret*
BnF – *Bibliothèque national de France* (National Library of France)
CCF – Congress for Cultural Freedom
*Collection Famille Iannis Xenakis*
© Famille I Xenakis DR – copyright by *Collection Famille Iannis Xenakis*
CND – *Centre National de la Danse*
© CND – copyright by *Centre National de la Danse*
Cont. – continuation
ENSAM – *École Nationale Supérieur Arts et Métiers* (Metz)
INA – *Institut national de l'audiovisuel*
© INA – copyright by *Institut national de l'audiovisuel*
LPS – Les Percussions de Strasbourg
LPSA – Les Percussions de Strasbourg Archives
© LPSA – copyright by Les Percussions de Strasbourg Archives
MCASC – Marine Corps Archives and Special Collections
Meas. or meas. – measure(s)
MWM – melodic wave motion
NMC – New Music Concerts
© NMC – copyright by New Music Concerts
O.Mo. – order of movements
OM – musical work (in French, *Œuvre Musicale*)
ONR – *Opéra National du Rhin*
ONRA – *Opéra National du Rhin* Archives
© ONRA – copyright by *Opéra National du Rhin* Archives
POLMIC – Polish Music Information Centre
© POLMIC – copyright by Polish Music Information Centre

## Terms

SIX-XEN: original concept of the instrument created by Xenakis; the term was written as indicated by the composer himself.

Sixxen: the complete instrumental set containing 114 metallic bars divided into six groups of 19 bars (six unities) and requiring six musicians to be played as a whole.

sixxen: part of the set containing 19 metallic bars and generally played by one musician (one unity).

## Observations

**1)** All quotations from manuscripts and handwritten notes will respect their original presentation. Thus, a word corrected in the original documents will be presented here crossed out; the capitalized or underlined words will remain so; and highlighted elements will be reproduced for accuracy.

**2)** Xenakis' scores will be generally indicated, specifying two essential parts. The introduction and presentation of the piece will be numbered in minuscule roman numerals. Arabic numbers will indicate the specific part containing the score, and the difference between the full score and individual parts will also be mentioned when necessary. Thus, e.g., *Jonchaies* (1977) has three pages of introduction (Xenakis, 1977, pp. i-iii) and thirty-five pages of musical staff (Xenakis, 1977, pp. 1-35). In the case of *Pléïades*, more details are required because the piece is divided into four movements and there are different printed versions (1979, 1988, and 2013) that will be mentioned throughout the present text. In this case, it will be specifically indicated the version of the piece (e.g., Xenakis, 1979), if it is tied to the pages of the introduction (e.g., Xenakis, 1979, p. ii), if it is something coming from the musical staff in specific movements (Xenakis, 1979, «*Métaux*», p. 13) or from the individuals that were produced in 1988 (Xenakis, 1988, «*Métaux*», ind., p. 1).
When an image of a score is presented, the source is indicated as: name of the piece, movement, specific measure(s), player (if necessary), the indication of the composer and publishing year, as well as the copyright owner. In this way, an example would be: *Pléïades*, «*Claviers*», meas. 108-111, player A (Xenakis, 2013) – © Éd. Salabert.

# Preface

The first time that I heard of the SIX-XEN was in 2005. With the conservatory closed for a week's holiday, I remained in an interior city of the State of São Paulo (Brazil) where students from distant regions or who did not have enough money to return home had to stay. During these days, I daily visited a friend to talk about music and hear some CDs that a professor had lent. In the middle of many others, there was the recording of *Pléïades* by Les Percussions de Strasbourg. When pushing the play button to hear it for the first time, with the music starting (certainly the beginning of «*Mélanges*»), time stopped, and I remember that both of us stayed glued to the instant, this exquisite sonority invading all the space of the living room. No space was empty, no substance remained the same, not a part of the skin, not a pore was left untouched, no thought was making sense anymore, the laws of nature seemed to have changed, and the universe's physics turned upside down. During the following days, this album would replay many times, always with the same question: what is this instrument? A question that started to push many others: what is happening? What is this? Which kind of effects is it producing? How is it produced?

The questions were only starting to appear and growing stronger by the minute. From this first moment, so strangely disturbing and markedly vivid as well as never forgotten, I would not imagine facing the challenge of answering some of these questions years later. It was impossible to predict at this specific moment that it would be a recurring subject, occupying a large part of my interest and requiring total attention in an important part of my life.

The reencounter with the piece would occur five years later, and the ensemble that recorded the famous CD would be part of it. I played the movement «*Peaux*» in 2010 in a project between the *Conservatoire de Strasbourg* and Les Percussions de Strasbourg, for three performances during the Festival Musica and an event of architecture. In 2011 Flo Menezes, a Brazilian composer, was invited to write specifically using the Sixxen of Les Percussions de Strasbourg. He contacted me and I then had the opportunity to accompany him during the visits and the instrument presentation (not imagining yet that it would be central in my life later).

My interest in the performance of *Pléïades* entirely and the construction of a Sixxen formally began in 2013. At the time, a project was submitted to obtain funding to construct Brazil's first Sixxen. Fundamental research on metallic materials was made possible through research investment agencies' funding. After receiving the approval[1], I started coordinating a group of researchers with

[1] Different Brazilian research agencies funded the whole project such as the National Council of Scientific Research (*Conselho Nacional de Desenvolvimento Científico e Tecnológico*–CNPq), the Secretariat of Creative Economy of the Ministry of Culture (*Secretaria de Economia Criativa do Ministério da Cultura*–SEC/MinC) and the Federal Institute of

the participation of Prof. Dr. Fabio Fonseca de Oliveira, Prof. Dr. Fernando Martins de Castro Chaib, and Prof. Dr. Luís Pena Oliveira. This group was further complemented by Prof. M. Catarina Percinio, Prof. M. Leonardo Bertolini Labrada, Prof. Leonardo Caire, and different students and collaborators. The activities focused on constructing a Sixxen, and we started to test countless possibilities of materials for this purpose. We produced different prototypes (eventually achieving the construction of two complete and finalized Sixxens with essentially the same characteristics, one for each of the two institutions involved), and we commissioned new pieces performed during several concerts. This overview of activities enabled me to develop and understand many aspects of the instrument's construction, with most of the activities extending until 2016. However, many elements remained open, as there were still significant gaps in some of the information about the SIX-XEN and Xenakis' work. Due to the lack of access to European archives, especially Xenakis' manuscripts, many details about historical, aesthetic, and compositional aspects remained inaccessible. Over time I noticed a lack of discussion on numerous aspects that I considered personally intriguing, and as much as they seemed to me extremely pertinent, they remained little addressed by other academic works.

I initially envisioned a more extensive overview of microtonal metal percussion instruments for the doctorate. However, it was clear that many aspects about the SIX-XEN and *Pléïades,* which had until then remained untouched or superficially discussed, were deserving of more elaborate discussions. In addition, the fact that I was developing this research work in Europe would give me access to numerous archives and direct sources of information that were previously unevaluated. It was thus decided, together with the directors, that the focus would be on Xenakis and his instrument. As I had already participated in an entire construction project, we then decided to focus on 1) historical, conceptual and analytical aspects that had rarely been addressed in terms of musicological research and 2) developing a new repertoire using a Sixxen as part of practice-based research. Both aspects would dialogue in terms of their possible relations with the artistic traditions of Indonesia that were part of Xenakis' knowledge and experiences.

This research answered a larger part of my previous questions and inspired many new ones. I sincerely hope the present text will have the same effect on its readers.

Education, Science and Technology (*Instituto Federal de Educação, Ciência e Tecnologia*–IFG) by different ways of investment (*Chamada Universal*, PROAPP/IFG, PIBIC/IFG and PIBITI/IFG).

# Introduction

Iannis Xenakis (1922-2001) is one of the most emblematic composers of the 20th century, having opened critical perspectives that artistic creation and approaches have generated in the post-WWII period. He seems detached from the dominant compositional trends of that period, and he proposed concepts and tools that were so consistent and innovative that they configured a totally new and complete approach in theoretical and practical terms. His contributions were enormous, and they went beyond the limits of purely musical knowledge and practices, given the dimension of his work and the bridges he established between different fields of human knowledge, either artistic or scientific. By not following the more axiomatic approaches of the time and searching for his own voice, he founded a whole new approach in terms of conception, understanding, and production of music, leaving extremely consolidated bases of theoretical and practical issues for the next century. As Mâche (2002, p. 113) stated, "Xenakis lived only one month in the 21st century,"[1] and yet he has forever changed all the possibilities and bases of application of knowledge for what will then be produced.

Xenakis' contribution to different musical fields and in connection with various scientific currents has made possible a new approach for composition, sound synthesis, and computer applications in music. Xenakis has always shown a great interest in the possibilities of creating new sounds and new approaches to sonic production, as exemplified by the research on and production of specific digital-to-analog converters (DAC), conceptualization and creation of the granular synthesis, the invention of the UPIC (first drawing interface for sound translation from a computer), and the constitution of the CEMAMu (*Centre d'Etudes de Mathématique et Automatique Musicales*)[2]. His first contributions to orchestra repertoire also highlight an intense production, such as with *Metastaseis'* (1953-54) treatment of strings, acoustic sonorities and textures which attest to a sort of revolution in terms of renewing of the timbral possibilities for this formation[3]. As Boivin (1995, p. 115) stated: "The work is received like a bomb thrown in the face of the ultra-serial clan during its

[1] "Xenakis n'aura vécu qu'un mois au XXI$^{e}$ siècle." (Mâche, 2002, p. 113). Mâche originally stated it in a text in German in 2001 (Mâche, 2001) and republished the text in 2018 (Mâche, 2018, p. 237).

[2] As himself stated about some of these innovations during an interview: "In the early 1970s, we produced the first converters in the world with a resolution of 52,000 samples per second and 16 bits per sample. We had to produce sound by programming computers and then storing the samples on digital tape. Then the digital tape was translated by our converter into sound. Later we received more grant money in order to create the UPIC system, with graphic input via a drawing board. The UPIC is linked to a minicomputer, or to microprocessors in the present case. I hope that this development will continue also with the help of manufacturers; their task is to forge ahead in implementation technology and to make it better, faster, and cheaper!" (Lohner, 1986, p. 50). See more details in Marino, Serra, & Raczinski (1993).

[3] This piece is also an important achievement in terms of intricate interconnexion between complex geometry, combinatory calculus, musical composition and design later transformed in a direct inspiration for the architectural proposition of the Pavillon Phillips at the Brussels World's Fair (1958).

creation in 1955 at the Donaueschingen Festival"[4].

With this great interest in the constitution of new sound possibilities, it is not strange that at some point Xenakis wanted to create a new musical instrument. Even if his contributions are much more obvious in electroacoustic creation, it seems natural that his compositional approaches at a certain point pushed him to conceive a new acoustic support for expressing his creative reflections and aspirations. At the end of the 1970s, he inspired the creation of an innovative instrument called the SIX-XEN to perform *Pléïades* (1978), a masterpiece for percussion sextet, and he dedicated time to experimenting and trying to come up with a suitable model. The acoustic instrument that Xenakis created is unique and can shed light on many details of his compositional thinking and artistic endeavors, also pointing to many characteristics that are consequent to his consistent and constant contact with Eastern music (especially from Indonesia). It can thus make his compositional decisions related to microcomposition, macrocomposition,[5] and timbre research (as acoustic or electronic sounds) more meaningful, opening doors to the understanding of his aesthetic principles and creative processes but also to performance perspectives (be it in terms of imaginary and artistic decisions, or rational and technical practical applications).

Whether through hearing or reading Xenakis' music, it is possible to perceive that his timbre treatments are fundamental to understanding his relationship to composition and his creative process. In this way, the acoustic instrument that he created and the piece composed specifically with it could thus be an essential key to address the composer's conceptions about sound constituents and characteristics. It was through an attempt to create a new category of instrument that Xenakis tried to renew the sensitive possibilities of human listening. However, the originality that he sought for the SIX-XEN rests on an apparent dichotomy of listening identified and addressed in this study. Previous studies have not thoroughly evaluated this conceptual renewal of the timbral phenomenon that Xenakis tried to put into practice through his acoustic instrument.

Xenakis' brief concise description and a certain discretion concerning the instrument in his writings and interviews constitute an additional difficulty in understanding the concepts involved. He was also a recognized engineer and architect with a very innovative and refined mastery of the profession[6]. However, he did not leave a technical project of a precise model of the SIX-XEN (which

[4] "L'oeuvre est reçu comme une bombe lancée au visage du clan ultra-sériel lors de sa création en 1955 au festival de Donaueschingen" (Boivin, 1995, p. 115).

[5] Both terms were addressed by the composer in his book *Kéleütha* (Xenakis, 1994) and could be defined as the level of the composition interfering in the intrinsic constitution of an individualized sound (microcomposition) or in the structures that formally aggregate individual sounds (macrocomposition). These concepts will be better addressed in Chapter 3– Subchapter 3.3.

[6] Xenakis worked with Le Corbusier from 1947 until 1959 and developed many important and vanguardist projects such as *Unité d'Habitation de Marseille* (France), *Chandigarh* (India), *Couvent Sainte-Marie de la Tourette* (France), *Pavillon Philips* (Belgium), among many others.

would have been relatively easy for him). In addition to this, the composer seemed to be looking for something with the instrument that was not always clearly expressed (or even expressible) in words, which could explain his dissatisfaction with several models and his continuous disagreement with certain sonorities developed.

The instrument SIX-XEN and the piece *Pléïades* have numerous characteristics that could indicate some contact with Indonesian music by the composer, reflecting it in terms of conceptual definitions and practical manifestations (the resulting sonorities being just one part of that). The composer addressed few of these aspects when discussing the instrument or the piece, even if he always mentioned their importance and gave examples from musical traditions from all over the world while discussing various subjects about music. However, in the present text, it will be apparent that the convergence of different *ex situ* interactions and *in situ* experiences with Indonesian gamelan music gave Xenakis tools to conceptualize his instrument and part of the structure of *Pléïades*. A specific study about the composer's access to Indonesian performative arts and how it could be reflected in his work has rarely been done before.

The present research highlights an acoustic instrument and the piece for which it was initially conceived to consider a broad perspective and understanding of the Xenakian art-science approach to his overall creative process. As Barthel-Calvet (2000, p. 14) expressed, "this art-science has the coherence of a system, as much in its philosophical premises as in its theoretical developments and the outcome of its creations"[7]. The study of this particular field is also addressed by an interest in its performative qualities and potential applications in musical practices.

The present text is divided into four parts to achieve the perspectives above mentioned. Part I focuses on the historical aspects of the composer's interests, exchanges, and experiences with Indonesian musical traditions (Chapter 1) and the aspects surrounding the *Pléïades'* commission and composition (Chapter 2). It discusses the main description and characterization of the SIX-XEN concept that evolved in Xenakis' written publications and interviews (Chapter 3), as well as the different pieces and spectacles that the composer ended up applying his acoustic instrument (Chapter 4). This first part thus initially brings a particular focus on the composer's life, on a period far before the composition of *Pléïades* (but that has direct implications in it) or surrounding the composition and premiere of the piece and creation of SIX-XEN, as well as the different ways the composer imagined it could serve his artistic intents.

Part II centers on the piece and the composer's interest in using a new instrument and highlighting the traditions from which it directly derives (the gamelan music). From these

[7] "[...] nous sommes intimement convaincue que cet art-science a la cohérence d'un système, tant dans ses prémisses philosophiques que dans ses développements théoriques et l'aboutissement de ses créations." (Barthel-Calvet, 2000, p. 14).

perspectives, Chapter 5 is a synthetical introduction about the main compositional tools and approaches verifiable in the piece and fundamental to Xenakis' production in the second half of the 1970s and 1980s. This chapter is thus a fundamental and summary review for a better understanding of the formal analysis of the work addressed in Chapter 6. This chapter points to elements of the Indonesian musical tradition, but a complete chapter is necessary to consistently highlight, characterize and explain these numerous aspects, as exemplified by Chapter 7.

Part III is centered on the personal artistic development that the present author acquired. It addresses the practical implications he was inspired to incorporate in his artistic work and the exchanges he experienced by contacting musicians (performers and composers) of different traditions and perspectives. Performative practice guidelines were outlined through the interconnection of the present text's three parts, thus producing a practical application of the research's theoretical and analytical aspects. This part is composed only of Chapter 8 and is complemented by all the online materials available to access the artistic production tied to this thesis. This extension represents at least four hours of concert recordings (videos essentially) and additional materials (scores and ephemera from each concert such as photos and program notes).

The last section of the present text, Part IV, is a broad characterization of the development of the instrument SIX-XEN. It thus traces an initial historical overview of the percussion ensembles that built a Sixxen for their activities, whether with Xenakis' direct contributions or not (Chapter 9). Chapter 10 is a comprehensive overview of the constructed prototypes and models, bringing quantitative and qualitative information about the ensembles, the specific characteristics of interest, and the worldwide practical achievements. To close the whole discussion, Chapter 11 addresses the specific repertoire when performance requires a complete Sixxen. It emphasizes that, after Xenakis' main contributions, many other composers expanded the repertoire for the instrument and ensembles recorded it. This conclusive fourth part paints a significant picture of the percussion ensembles that worked with Xenakis or not and their achievement in terms of prototypes built, recordings produced, and repertoire developed.

A composer, a piece, an instrument, and a context inspired by Indonesian traditions, are the four main perspectives that could summarily define the present object of study and help to understand how it inspired an actual creative process by the performance of historical pieces but also by the commission of new ones. Before presenting the methodological procedures adopted here, different introductory aspects will be addressed. It is thus essential to understand the context in which Xenakis' interests turned to percussion and, because this instrument has very peculiar characteristics and specific requirements, an initial description is also necessary and will allow for a first basic understanding of the main concept (further achieved as a whole in Chapter 3).

## Xenakis and the composition for percussion

Contextualizing Xenakis' interests and connections with percussion is fundamental. Something about this instrumental family seems to have become so essential in his compositional approach that the only acoustic instrument he created would, because of that, be of this category. In terms of his period of studies and formation as a composer, percussion represented a constant presence in notes, sketches, compositional exercises, and initial *études*. This initial material shows that, even in his early thinking, both rhythmic elements and percussion instruments occupied an important status. On the first page of his Notebook 1[8] (with the indication of September 1951), he addressed aspects of the structuring of time and rhythmic characteristics in music. From October 1951 onwards, he focused on Hindu music, which he mentioned as the "most civilized and the most perfect organization of rhythm"[9] (Xenakis, Notebook 1, October 1951, p. 3). In this same text, he mentioned a percussion instrument when he stated that: "The tabla is amazing. To organize time mathematically means Hindu rhythm. With one sound (noise), one can make many oppositions. With two, even more (rich). With a range of ~~noise~~[10] sounds, e.g., ~~sounds~~ one should arrive at a bewildering and ungraspable complexity."[11] (Xenakis, Notebook 1, October 1951, p. 7). He even drew the instrument and showed the quantity of possible sounds made with each hand (Fig. 0.1); however, the instrument he drew seems more a mrdangam than a tabla[12].

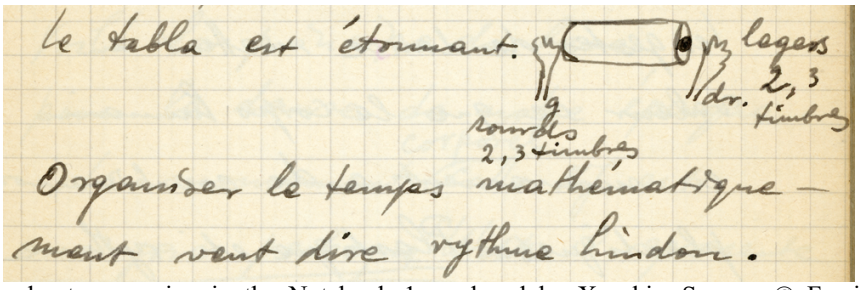


***Figure 0.1***. Notes about percussion in the Notebook 1 produced by Xenakis. Source: © Famille I Xenakis DR (Notebook 1, p. 7).

Indian instruments seem to have motivated and inspired Xenakis, as some of his documents

[8] His notebooks are stored in Paris at the *Collection Famille Iannis Xenakis*. For more details about his notebooks, the reader is invited to consult Barthel-Calvet (2012).
[9] "Organisation la plus civilisée du rythme et la plus parfaite." (Xenakis, Notebook 1, October 1951, p. 3).
[10] To respect the original notes, all word that the composer corrected in the original will be indicated as a crossed-out word. In this way, Xenakis replaced the word noise by sounds.
[11] "Le tabla est étonnant. Organiser le temps mathématiquement veut dire rythme hindou. Avec un son (bruit) on arrive à faire beaucoup d'oppositions. Avec deux, encore plus (riches). Avec une gamme de ~~bruit~~ sons p. ex. ~~sons~~ on devrait arriver à une complexité ahurissante et insaisissable." (Xenakis, Notebook 1, October 1951, p. 7).
[12] Due to the position of the instrument to be played and the use of both hands on the same drum, which is made up of only one body with two skins, it can be seen that Xenakis was dealing with a mrdangam (also called mridangam), and not a tabla.

show an interest in transcribing the rhythmic patterns played on these instruments. Different authors attest that those are contributions from Olivier Messiaen's classes (as highlighted by Solomos, 2008a; and Barthel-Calvet, 2013). Xenakis himself also reinforced the same when he stated during an interview later on that "I was very interested in what [Messiaen] said about Indian rhythms – the way he combined and transformed them was new to me [...]" (Varga, 1996, p. 32)[13]. These interests turned to traditional instruments, sonorities, and, most important, musical structures and formal proceedings, which grabbed the attention of the composer, that invested a certain amount of time trying to elucidate its specific aspects. In Xenakis' personal archives, a score with conventional notation and a graphic score attest to this, and the association of the material with initial stages of his creative process was indicated by Mâkhi Xenakis (2022)[14] that also points the importance of this early production. The documents also show the amount of dedication he put into making his observations, finding ways to understand what he heard from a recording (a disc called "*Rythmes sur tabla. Tala ruapka, Tala ata, Tala gumpa*") and developing its transcription. The conventional score, which Xenakis called *Rythmes sur tabla. Tala ruapka, Tala ata, Tala gumpa*, was completed in January 1953 (Fig. 0.2) and consists of four pages. It presents a sequence of changing time signatures in 2/8, 3/8, 4/8, 5/8, 6/8, 7/8, and 7/16, using three basic pitches and attacks with different accents. The distances are thus established with numbers according to the arrangement of each element in time, based on Xenakis' observations of the distances in traditional Indian music, which he translated to mathematical relations.

This score was analyzed in greater detail by Mâche (2009), who classified it as an early work and stated that it may have been a gift to Françoise Xenakis (which the dates do not corroborate as pointed by Mâkhi Xenakis, 2022). It was also the object of Declercq (2022 and 2024) who, working with Mâkhi Xenakis, associated it with initial sketches of early pieces and *Metastasis*. Thus, *Rythmes sur tabla. Tala ruapka, Tala ata, Tala gumpa* does not appear to be an original work as classified by Mâche (2009) but more an *étude* of transcription, something that his statement could even corroborate: "I studied Indian percussion music a long time ago – not to imitate it but to understand

[13] In Xenakis' notes a specific passage attests of the direct connection that different musical traditions and Messiaen's classes have in his own initial production. "15 November 1952. Messiaen saw the *Zyia*. He read it carefully and found some mistakes in the copy. He said to me: 'But it is formidable the progress you have made since the harmonizations. You now have a language, a style. It is very, very good. How did you do it? Do you realize that?' I said that it was thanks to him, to his encouragement, to his lessons, then to Hindu rhythm, to Le Corbusier and to Greek popular music. He repeated his astonishment several times." As originally presented: "15 novembre 1952. Messiaen a vu la Zyia. Il l'a lue attentivement en en trouvant des fautes de copie. Il m'a dit : « Mais c'est formidable le progrès que vous avez fait depuis les harmonisations. Vous avez maintenant une langue, un style. C'est très très bien. Comment avez-vous fait ? Vous vous rendez compte ? ». J'ai dit que c'était grâce à lui, à son encouragement, à ses leçons, ensuite à la rythmique hindoue, à Le Corbusier et ~~à~~aux la musique populaire grecque. Il m'a répété son étonnement à plusieurs reprises." (Xenakis, Notebook 1, November 1952, pp. 40-41).

[14] Mâkhi Xenakis, who has always been interested in her father's creative process, brought to light interesting documents in 2020 and published it in the second edition of her book *Iannis Xenakis: Un père bouleversant* (Xenakis, 2022).

the underlying principle, these shifts of rhythm which produce a multi-layered system even on a single instrument." (Varga, 1996, p. 147).

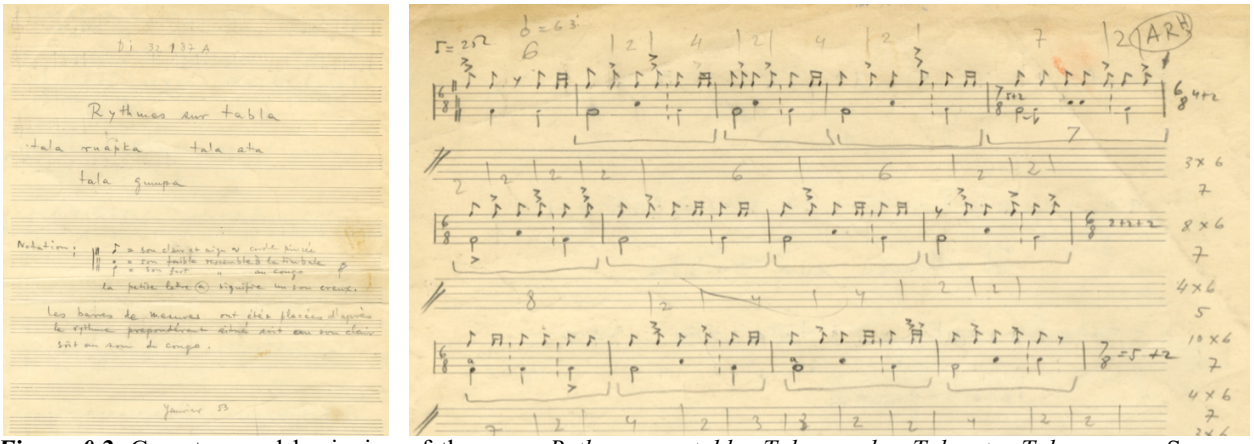


***Figure 0.2***. Coverture and beginning of the score *Rythmes sur tabla. Tala ruapka, Tala ata, Tala gumpa*. Source: © Famille I Xenakis DR.

On the other hand, if the graphic score (Fig. 0.3) was produced in the same period as *Rythmes on tabla, Tala ruapka, Tala ata, Tala gumpa*, it could show the very beginning of his tendency to write musical material on millimeter paper (as expressed by Mâkhi Xenakis, 2022). A possible reference to Indian instruments is visible, but specific details that would confirm the distinct drums to which he was referring are missing (the instruments represented are, potentially, the mrdangam above and the tabla below—on the top left corner of Fig. 0.3).

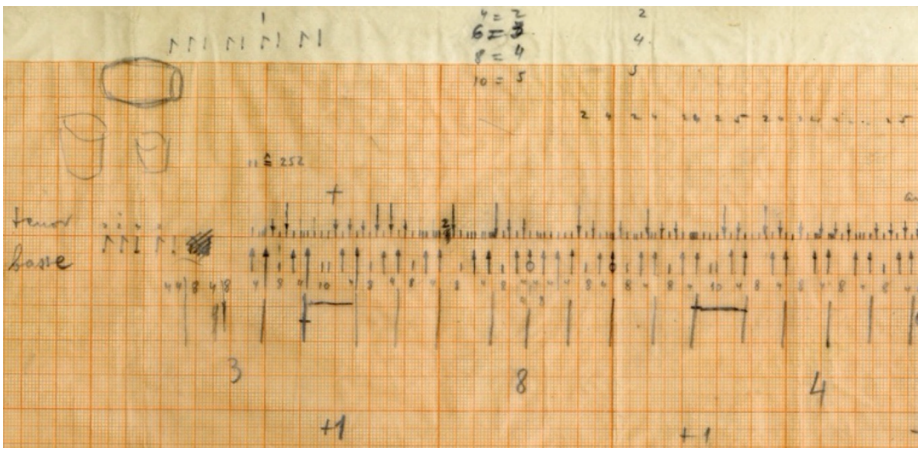


***Figure 0.3***. Analysis of rhythmic material associated with percussion instruments (top left) made by Xenakis on millimeter paper. Source: © Famille I Xenakis DR (OM 1-1, p. 1).

This document could therefore show that the first time he used millimeter paper to write rhythmic progressions in time separated by numbers according to the distances between attacks and pitches was in connection with percussion instruments. Unfortunately, the material does not have a date; it is classified as OM 1-1, a category that includes the *Metastasis* (1953-1954) sketches, and

though the precise date is not certain, the type of millimeter paper attests to the fact that the material could be from this same period (see more details and the connections with Xenakis' creative process in Mâkhi Xenakis, 2022, as well as Declercq, 2022 and 2024).

Xenakis' notebooks from the 1950s contain several references to percussion instruments, be they among his notes from Messiaen's classes, his conceptual writings, and commentaries, or his study exercises and early pieces. After this fundamental period of his studies, his profound ties with percussion music would also be perceptible in the later repertoire he created specifically for this family of instruments and the attention he gave to them in many important pieces. Among them, he composed four pieces for percussion ensemble—*Persephassa* (1969), *Pléïades* (1978), *Idmen A B* (1985), and *Okho* (1989). The first three pieces were specially dedicated to and premiered by the percussion sextet Les Percussions de Strasbourg, and the last one to/by the Trio Le Cercle (both groups being from France). For solo percussion, he wrote *Psappha* (1975) and *Rebonds* (1987-1988), both dedicated to and premiered by Sylvio Gualda, with *Psappha* becoming his most frequently played piece, as expressed by Solomos (1996, p. 75). As for repertoire for mixed duos that include percussion, he composed *Dmaathen* (1976) for oboe and percussion, *Komboï* (1981) for harpsichord and percussion, *Kassandra* (1987) for baryton and percussion, and *Oophaa* (1989) for harpsichord and percussion. For medium-sized mixed ensembles, he composed *Khal Perr* (1983) for five brass instruments and two percussionists (premiered by Quintette Arban and Alsace Percussions) and *Zythos* (1996) for trombone and percussion sextet (premiered by Christian Lindberg and Kroumata Percussion Ensemble). He composed *Aïs* (1980) as a concerto for baryton and percussionist with a complete orchestra, and his last piece, *O-Mega* (1997), takes a sort of concertante form for percussion soloist and ensemble.

Not only do the number of important pieces with percussion and the constant presence of these instruments in his work attest to a deep relationship, but the duration of those compositions is equally not trivial. When asked in an interview with Enzo Restagno (on March 1988) why his specific percussion works, *Pléïades* in particular, had a duration that considerably exceeds that of compositions dedicated to other instruments, the composer answered: "Usually my pieces have an average duration of slightly less than twenty minutes; with percussion things are different, and I happen to cross that limit. I probably find it easier to write for those kinds of instruments, even associating them with a soloist, as I did recently with the harpsichord."[15] (Restagno, 1988, p. 49).

[15] Xenakis was maybe mentioning the fact that he was then working on *Oophaa* (1989). It is less probable that he was mentioning *Komboï* (1981) or *A l'île de Gorée* (1986), the last one being a piece for soloist harpsichord with ensemble, but without percussion. As originally mentioned: "Come mai i tuoi lavori per sole percussioni, 'Pléiades' in particolare, hanno una durata che supera notevolmente quella dei componimenti dedicati ad altri strumenti? Di solito i miei pezzi hanno una durata media leggermente inferiore ai venti minuti; con le percussioni le cose vanno diversamente e mi capita di varcare quel limite. Probabilmente mi riesce più facile scrivere per quel tipo di strumenti, anche associandoli a un

It is also noticeable that his output involving percussion was more significant in the 1980s than in other decades. After *Pléïades*, interest in Xenakis' chamber music with percussion grew, and mixed commissions (either in small instrumental groups or in medium-sized ensembles) gained a new impetus. This prolific production was essentially a consequence of the interest of musicians and the engagement of percussionists, as Xenakis himself declared in a 1989 interview:

> It's crazy, there are a lot of percussionists who ask for new things every time, and as I like percussion and, especially, I like the people who do it, I write for percussion, and that's why I sometimes write less for the other formations.[16] (Xenakis, 1989).

His use of percussion in solo and chamber music is intense, but his interest in the sonorities of percussion instruments is also clearly perceptible in his orchestral repertoire. After all, who could forget the contrasting sonorities of the woodblock and triangle in *Metastasis* from 1954, especially when they create such a brutal contrast with the upsetting glissandi of the first section? Or yet, who could miss the importance of the percussion instruments in the sea of sounds with which *Terretektohr* (1965–1966) submerges the entire orchestra and audience? So, when Xenakis decided to create a new acoustic instrument, what did he choose? A percussive one! Even if he had created different innovative electronic tools[17], the only complete acoustic instrument he integrally conceived was for percussion. In his percussion pieces, Xenakis deeply explored many of his approaches, be they tied to his specific conceptions of rhythms, polyrhythmic superpositions, textures, shapes of musical structures, instrumental disposition on space, or sound spatialization. In *Pléïades,* a specific layer is added to the research on the timbre parameter in a particular way. Through a new acoustic instrument, he consciously touched on the discussion about sound and noise—harmonicity and inharmonicity—by showing possible variations within their interstices. Thus, amid the wide spectrum of acoustic instruments created in the 20th century, Xenakis joined the ranks of innovators and original creators who have broadened the limits of instrumental typology. His personal engagement in creating it and the contributions of the percussionists and percussion ensembles who made it possible are thus fundamental to be evaluated.

## A synthetical way to understand the SIX-XEN

To begin with, it is important to make the distinction between three terms which will be used

solista, come ho fatto recentemente con il clavicembalo." (Restagno, 1988, p. 49).

[16] "C'est fou, il y a beaucoup de percussionnistes qui réclament des choses nouvelles à chaque fois et comme j'aime bien la percussion et surtout j'aime les gens qui en font, j'écris pour la percussion et ce qui fait que j'écris parfois moins pour les autres formations." (Xenakis, 1989).

[17] Due to his very close connections with electroacoustic music and mediations between sound and computerized realization, Xenakis created an interface with electronics, being the result of years of research and an important tool for composition (UPIC), as he used this apparatus to create acousmatic pieces.

recurrently in this text. SIX-XEN is the concept of the instrument as a whole, as initially written by Xenakis, Sixxen is the complete instrument, formed by six units called sixxen.

Based on Xenakis' indications, the SIX-XEN would be a metal instrument consisting of 19 different bars (perceptible from low to high) for each of the six differently tuned units (sixxen), resulting thus in a total of 114 microtonally distanced bars that should form a collection of sounds neither purely chromatic nor purely diatonic (Sixxen) which have to present perceivable different fundamental frequencies. The result is thus a percussion instrument with microtonal characteristics that is meant to be played collectively (something that was later diverted with the new pieces that were created for it), and that was initially openly described by his creator, making it possible to achieve different structural and acoustical results depending on constructive approaches and choices.

Seen collectively as a single instrument, the constituents (114 metallic bars) are divided into six units, each to be played by one percussionist (considering *Pléïades*, the original sextet composed for it), as exemplified by Fig. 0.4. It has microtonal characteristics because the 6 bars of a same "pitch" (for example the first bar of each unit) cannot form a unison – they can spread from -3/4 to +3/4 around the central pitch, which given the number of bars means a repartition in less than halftones between them. Seen individually, each sixxen consists of nineteen irregularly distributed pitches with perceptible distances; each corresponds to one piece of metal made of "bronze, steel or other metals". The tuning of the 19 pitches of each sixxen shall not be based on the octave or from tempered scales.

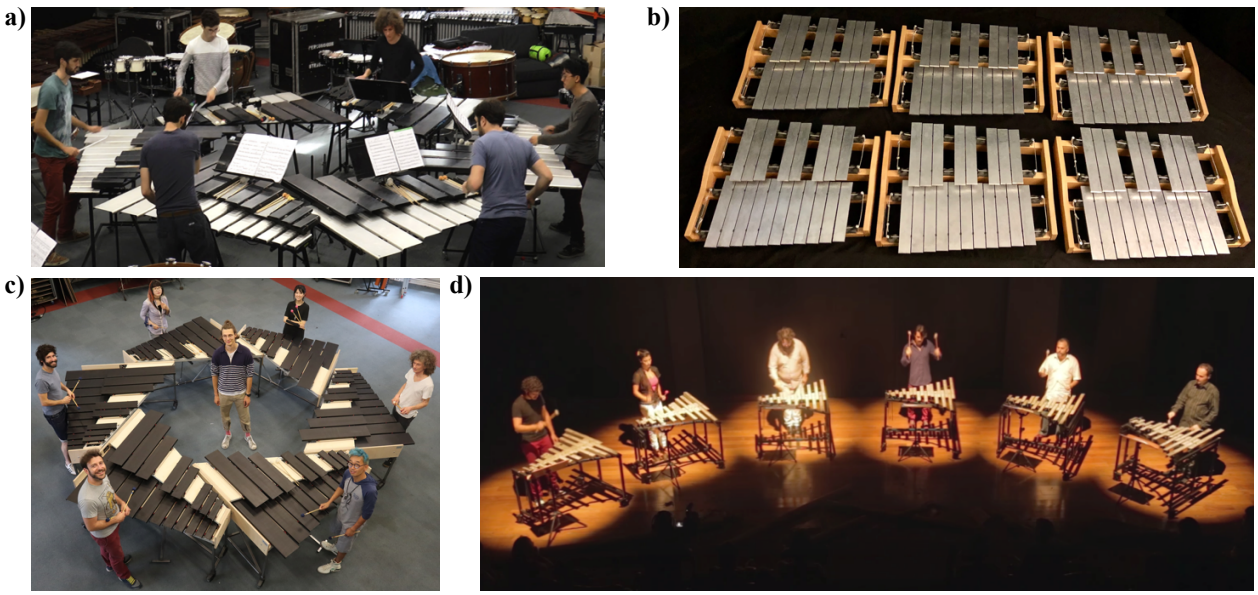


***Figure 0.4***. Examples of Sixxens constructed by different projects. **a)** Sixxen constructed with Xenakis for Les Percussions de Strasbourg (France). Source: https://www.percussionsdestrasbourg.com. **b)** Lunason (Switzerland). Source: https://www.lunason.com/sixxen. **c)** Les Percussions de Strasbourg (France). Source: https://www.percussionsdestrasbourg.com. **b)** Impact(o) (Brazil). Source: author's personal archives.

The description is open because the composer did not specify which metal, particular pitches

or range, and size of bars he preferred, giving many projects a certain degree of liberty to achieve it in one way or another. Iannis Xenakis was an architect and worked in one of the most prominent and important architectural firms of the 20th century with Le Corbusier. It is clear that it would not have been difficult for him to create a precise plan for his instrument and, after as much different tests and tries as he made, to decide which could represent his final model with all the details and specifications registered – if it was his will. However, it is not what happened, which is why different choices have been able to produce results so utterly different in terms of timbre, attacks, register, harmonics, and other constituents.

It is impressive that Xenakis has defined the proposal of an innovative instrument in very few paragraphs (essentially two, that were lightly altered over time–see more details in Chapter 3). The power of the textual synthesis added to the power of the conceptual cohesion makes that his proposal continues to this day to challenge the percussionist community and a number of constructors (the diversified products of this challenge will be better exposed in Chapters 9 and 10). Even if these aspects are imposed, they represent general requirements and highlight two main points now addressed: its collective aspect and the openness of its construction.

The collective quality of the SIX-XEN is not exclusive; many examples could be pointed out, indicating the necessity of two or more performers collaborating to manage the specific production of sound in one unique instrument. This collective perspective can be obligatory or optional, depending on how the instrument is constructed. Thus, in the first case, it is by the interaction of different persons that the object is activated and can present its sound qualities, being the presence of more than one musician a *sine qua non* condition to perform with it. The instrument called *a grande virgem* was created by Walter Smetak[18] in 1969-1970; being a 5 meters flute played by 22 musicians, each one responsible for one note and with their action directly interacting with the others. The instrument's dimension is not the only characteristic that obligates the presence of more than one musician. In reality, as stated by Scarassatti (2001), the device only works if it is practiced collectively by the 22 musicians. Staying in the category of flutes, the circle flute used in the album *Cornucopia* and its world tour by Björk is a more recent example (Fig. 0.5a).

[18] Walter Smetak (1913-1984) was a Swiss violoncellist, composer, professor, and artist that came to Brazil in 1937, dedicating most part of his career to create innovative instruments. It was as professor of the Bahia State University (*Universidade Federal da Bahia*, UFBA) that he created his most important instruments and influenced many different generations of musicians in Brazil. About the instruments developed by Smetak more details were addressed by Scarassatti (2001), Dantas (2010) and Scarassatti (2016), among others.

**a)**  **b)** 

***Figure 0.5***. Examples of collective instruments. **a)** Circular flute used by Björk in the album *Cornucopia*. Source: Social media by Björk (2019). **b)** Pindorama created by Walter Smetak. Source: Scarassatti (2016).

As briefly described in the social media of the singer:

> the circle flute played in *#cornucopia* consists of four conjoined flutes that are curved to form a circle. the instrument requires four players to come together into a quartet where each player is indispensable, and given that the instrument cannot be played privately, each player's relationship to the instrument becomes inseparable from their relationship to the other players. (Björk, 2019).

In the perspectives presented by the above examples, the "poly-performer-interaction" characteristic is obligatory to the stimulation of the instrument; without it, the instrument cannot be played and heard. On the other hand, some instruments present a collective character that is optional. In this way, another instrument created by Smetak in 1969-1970 and called *pindorama* could exemplify it. *Pindorama* is a 2.2 meters wind instrument constructed with PVC pipe, gourds, bamboo, plastic tubes, metal and wood as a gigantic sound sculpture (Fig. 0.5b). It was developed to be played by 60 persons at the same time, but one musician could activate it and have the production of some sounds. In this case, the musician alone would not activate many timbres that the instrument allows and that represent its most typical sonorities; the solo performance is possible but was not initially the main objective when the instrument was conceived. The SIX-XEN enters thus in this category in which the collective quality is non-imposable, with the instrument losing some sound qualities but still being playable by one unique musician. While *a grande virgem*, the circle flute, and the *pindorama* are instruments previously produced and do not command the participation of the musician to produce it, the SIX-XEN implicates specific responsibility of the percussionist because the composer only describes certain characteristics.

The openness of the SIX-XEN was always highlighted by Xenakis when describing his instrument. It exposes a certain amount of freedom for the person who wants to construct a Sixxen, and it is very important in terms of what would be produced, giving a chance to a diverse overview of possibilities to be created. About the fact that the SIX-XEN has open instructions, Ceuster (2021, p. 72) stated that "This was most likely to accommodate a certain pragmatism on the part of *Les*

*Percussions de Strasbourg*, who originally commissioned *Pléïades*, as the ensemble had to work with whatever pieces of metal were available." However, this is questionable and does not completely correspond with Xenakis' intentions and expectations. Initially, it could be argued that because there was not too much time for the piece's premiere, the composer imagined something more accessible to be found and easily constructed. However, everything that happened later[19] and all the information gathered here seems to point to a much different situation. Xenakis was consciously and intentionally adopting the SIX-XEN as an open instrument, something that has significant connections with other aspects of *Pléïades*, being something not completely new in his approaches to percussion.

In *Psappha*, e.g., the composer left total freedom for the percussionist's choice of instruments and timbres, indicating only a few suggestions. As stated in the score indications: "Only the desired global sonorities are indicated, which will cover the rhythmic structures and architectures of this piece. These are the ones that must be highlighted by balances of powers and timbres chosen out of the banal sonorities."[20] (Xenakis, 1975, p. 9). In the piece, the freedom extends to other musical parameters besides timbre, as it occurs with the indication of accents. They can have several interpretations, as the notice explains: "stronger intensity" (of course, as it usually indicates) but also "abrupt change of timbre," "abrupt addition of another sound," and "simultaneous combination of the previous meanings"[21].

In *Idmen A B*, he left several sections with varying and changeable percussion instruments, describing that "The nomenclature of percussion instruments in all sequences is indicative. They could be replaced by others but respecting the spirit of the music. For example: replace the neutral tuned skins by beautiful ones from Asia, Oceania, Africa..."[22] (Xenakis, 1985, *Idmen B*, p. 1).

In *Pléïades,* he established an even deeper relationship with timbre via an innovative instrument but through the interpreter's power of decision. He determines its construction through a description that allows countless choices and where freedom is again something determinant in the diversification of results that will occur with the final products. It is then in this sense that Reed (2003, p. 48) describes a unity in diversity by stating that "Based on a sampling of the available recordings of 'Pleiades,' this skeleton of instructions produces instruments with enough similarity to be recognized

[19] Just to mention a little example, Xenakis tested and experimented different materials, different shapes and different structures all over the years, never arriving in a unique and definitive model. He stood with the open description even after many Sixxens accomplished under his supervision, independently if it was constructed by artisanal or industrial constructors (such as Kolberg, Bergerault, and Yamaha).

[20] "Sont seulement indiquée les sonorités globales souhaitées, qui vêtiront les structures et architectures rythmiques de cette pièce. Ce sont elles qui doivent être mises en valeur par des équilibres des puissances et des timbres choisis hors des sonorités banales." (Xenakis, 1975, p. 9).

[21] As originally indicated: "intensité plus forte", "changement brusque de timbre", "ajout brusque d'un autre son", and "combinaison simultanée des significations précédentes" (Xenakis, 1975, p. 9).

[22] "La nomenclature des instruments à percussion dans toutes les séquences est à titre indicatif. Ils pourraient être remplacés par d'autres mais en respectant l'esprit de la musique. Par exemple : remplacer les peaux accordées neutre par de belles d'Asie, Océanie, Afrique..." (Xenakis, 1985, *Idmen B*, p. 1).

as sixxen, yet each reflects its own musical personality." Ceuster (2021) takes the opposite direction, seeing a complete difference inside the unity that the instrument concept assumes; for him, there is diversity inside the unity. He stated, "As such, there are large differences among the various sixxens, both in terms of pitch distribution and timbre, with some of them sounding so different from each other that they can barely be recognized as the same instrument at all." (Ceuster, 2021, p. 72). The present text discusses these connections more profoundly. What represents the SIX-XEN to the composer has a more profound connection to his musical approaches and thinking than previously discussed. Different moments of his life and work must be considered to understand the connection. As François-Bernard Mâche (interview by author, 2020), a great friend of Xenakis, stated:

> We didn't really discuss his instrument directly. What interested him was precisely that it didn't give notes but that it gave sensations of different registers, it seems to me that that's what he was looking for. But I don't remember precisely what we discussed about this, it goes back at least 30 years... [...] Yes, since what he was interested in was precisely not to have defined pitches, to have only impressions of different registers, so I understand very well that he left the composition of the metal, the size of the blades, all that open. He could have specified it if he wanted to, but he didn't do it voluntarily. [...] What interested him was not the practical side of the diffusion of an instrument, it was more for him, to do some experiments.[23]

"Experiment" is a keyword because, since 1979, Xenakis has challenged percussionists to experiment with new ways of searching, constructing, and performing with this acoustic instrument. As will be better addressed in Chapter 4, the composer also used his instrument to do experiments, artistic ones, and many of them. He then used his instrument in many different artistic contexts and possible configurations and even composed a new piece including it, having projected at least three more that were never achieved. However, the instrument was not only an experimental object for the composer. With it, Xenakis also encouraged musicians in a much closer relationship with the production of their instruments, trying to be a catalyst force giving an impulse to innovation. Vinko Globokar indicated the same direction mentioning that composers sometimes want to inspire the "capacity of invention" of the performer(s). As he stated:

> "The discovery of new timbres, new articulations, new sound phenomena on our traditional instruments, are caused by very diverse factors. On the one hand, there is the composer who, at his work table, imagines the craziest treatments, wanting, for example, to transpose a playing technique characterizing one family of instruments to another family. The means he employs can be musical; he then describes in detail the result he wants to obtain, forcing the performer to gradually become capable of producing what he has prescribed. But he can also operate in a 'psychological' way, by posing to the performer problems that are not directly

[23] "On n'a pas vraiment discuté directement sur son instrument. Ce qui l'intéressait c'est justement qu'il ne donne pas de note mais qu'il donne des sensations de registres différents, il me semble que c'est ça qu'il recherchait. Mais je me rappelle plus avec précision ce qu'on a pu dire à ce sujet, ça remonte à minimum 30 ans… […] Oui, puisque ce qui l'intéressait c'était justement de ne pas avoir des hauteurs définies, d'avoir seulement des impressions de registres différents, donc je comprends très bien qu'il l'aie laissé ouvert la composition du métal, la dimension des lames, tout ça. Il aurait pu le préciser s'il aie voulu mais volontairement il ne le faisait pas. […] Ce qui l'intéressait ce n'était pas en effet un côté pratique de diffusion d'un instrument, c'était plutôt pour lui, pour faire quelques expériences." (Mâche, interview by author, 2020).

> technical, and by appealing rather to his capacity of invention. For example, he will provide the instrumentalist with more material than he is capable of playing, the latter having to find a way to give a global idea of what is proposed, or he will impose on him simultaneously actions of opposite character, thus creating a situation of blockage, where there can only be a break, raw products, (the interpreter should be capable of splitting himself, 'playing' several characters simultaneously). [underline added]"[24] (Globokar, 1980, n.p.).

In these perspectives, the SIX-XEN enter in a more profound connection with Xenakis' thinking and production, something that could also bring new perspectives to its construction and to the performance of the piece. When referring to instruments as an element and the search for sounds, the composer stated in an interview in 1981: "the difficulty, the beauty of the sound is indeed to create. This is the value of the human being who is with his mechanical apparatus, that is to say, his instrument, and must produce through his mechanics the elementary thing which can be a whole poem, that is to say, the sound in itself, quite simple, without melody, without anything at all: the sound quality."[25] (Delalande, 1997, p. 61-2). The freedom of fabrication that the instrument carries attests to much more than a simple convenience or a lack of knowledge on the composer's part. Being an indeterminate instrument, the SIX-XEN carries in its conceptualization the trust given by the composer to the community of percussionists and builders, as well as the necessary engagement of the performer for a collaborative process that has multiple possibilities for development.

## Terminology about the Xenakian instrument

Some terminological considerations and conceptual delimitations seem necessary when addressing the SIX-XEN. In order to discuss the different levels of appropriation of such kind of collective instrument, it will be here delimitated three terms that can refer specifically to the description of the musical object and better indicate what is being the focus of the discussion in a determined point. It is thus essential to define the first term starting from the Xenakian concept itself, i.e., from ideal considerations and the appropriation of the object in the world of ideas. For this

[24] "Les découvertes de nouveaux timbres, de nouvelles articulations, de nouveaux phénomènes sonores sur nos instruments traditionnels, sont provoqués par des facteurs très divers. Il y a d'une part le compositeur, qui à sa table de travail, imagine les traitements les plus fous, voulant par exemple, transposer une technique de jeu caractérisant une famille d'instruments, à une autre famille. Les moyens qu'il emploie peuvent être musicaux ; il décrit alors minutieusement le résultat qu'il veut obtenir, forçant l'interprète à devenir progressivement capable de produire ce qu'il lui a prescrit. Mais peut aussi opérer d'une manière « psychologique », en posant à l'interprète des problèmes qui ne sont pas directement techniques, et en faisant plutôt appel à sa capacité d'invention. Par exemple, il fournira à l'instrumentiste plus de matériel qu'il n'est capable d'en jouer, ce dernier devant trouver le moyen de donner une idée globale de ce qui est proposé ou il lui imposera simultanément des actions de caractère opposé, créant par cela une situation de blocage, où il ne peut y avoir que cassure, produits bruts, (l'interprète devrait être capable de se dédoubler, « jouant » plusieurs personnages simultanément). [underline added]" (Globokar, 1980, n.p.).

[25] "[...] la difficulté, la beauté du son c'est effectivement de créer. C'est cela la valeur de l'homme d'ailleurs qui est avec son appareil mécanique, c'est-à-dire son instrument, et doit produire à travers sa mécanique la chose élémentaire qui peut être tout un poème, c'est-à-dire le son en soi, tout simple, sans mélodie, sans rien du tout : la qualité sonore." (Delalande, 1997, p. 61-62).

‘concept of an instrument’ the term SIX-XEN will be used (with all capital letters). This writing representation was adopted because it was the one the composer used in the introductory description of the first version of *Pléïades* (Xenakis, 1979). Why differentiate the concept of the instrument from its realization in itself? Because its realizations (including those accepted by the composer himself as possible versions of the instrument) do not necessarily match all the conceptual precepts that Xenakis formulated for that instrument, as it will be better addressed later.

Describing his relationship with the Les Percussions de Strasbourg, Xenakis gave some clues about the idea and the realization of the concept and the object being two different things. As he stated: “They are manufacturers of sound in the concrete state, I make them in the abstract state...”[26] (Batigne, 1981, p. 177). In a more precise perspective, this same aspect is better reinforced by the composer himself. In a letter to Claude Ricou, Xenakis stated about a specific model that the program notes should include the description: “the SIX-XEN are conceived by Iannis Xenakis especially for the 6 percussionists of Strasbourg, and were built by Robert Hébrard.”[27] (Iannis Xenakis, mail to Claude Ricou, December 16, 1985). The differences between abstract and concrete aspects seem clear even in projects where the composer was directly involved but that did not produce exactly what was initially described in his requirements. This is why the denomination SIX-XEN could then bring together all the initial conceptual inferences, imaginative abstractions, and plane of ideas that would translate the ideal(ized) instrument, thus bringing an appropriation of the composer’s conceptual search for such innovative instrument.

After being idealized by the composer, this SIX-XEN demanded a necessary practical formalization for the musical performance of the piece and started to represent a construction challenge. Here, two terms related to the object(s) built-in itself will be differentiated to further references all over the text. They are linked to a broader (114 metallic bars as a group with six parts) or a more specific perspective (19 metallic bars as a 1/6 part of the instrument with a potential independent use) about the Xenakian instrument. Thus, to the clearest designation of both categories (a view of the ensemble “as a whole”–as a macro-object–or of 1/6 of the Sixxen–as a smaller object), two terms will be used: the whole set will be referred to as Sixxen (with capital S), while the parts will be called sixxens (with lower s) or unities. When referring to one sixxen (19 pitches), two sixxens (two groups of 19 pitches), and other proportions, it is clear that it is just part of the unities of the whole object, a Sixxen (114 pitches). See Fig. 0.6 to visualize the difference between a Sixxen and a sixxen.

[26] “Ce sont des fabriquants du son à l’état concret, moi je les fabrique à l’état abstrait...” (Batigne, 1981, p. 177).
[27] “[...] les SIX-XEN sont conçus par Iannis Xenakis spécialement pour les 6 percussionnistes de Strasbourg, et ont été construits par Robert Hébrard.” (Iannis Xenakis, mail to Claude Ricou, December 16, 1985).

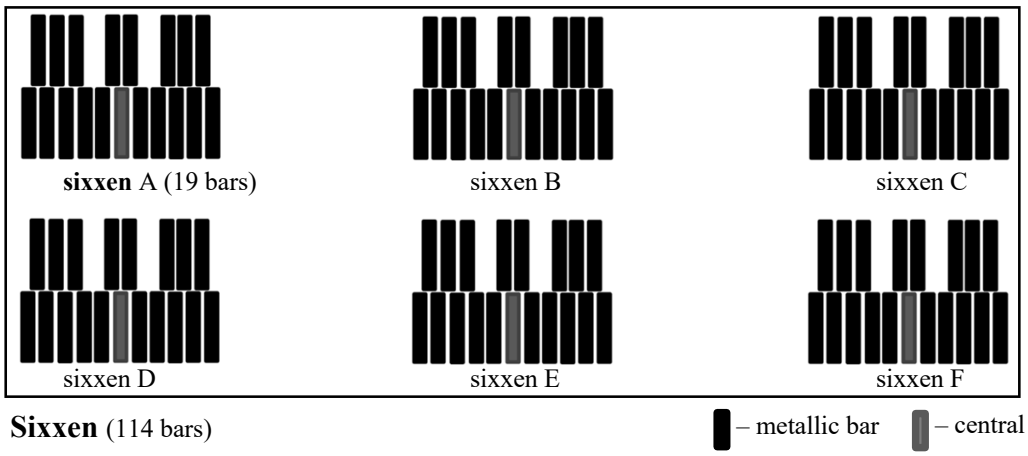


***Figure 0.6***. Schematic representation of a Sixxen and its six parts, sixxens A to F.

If the term is written as Sixxens, two or more complete setups are referred to (two or more macro-objects). Because Xenakis used classification in letters from A to F to refer to each individual part of *Pléïades*, sometimes it will be here specified the unities as sixxen A, sixxen B, sixxen C, sixxen D, sixxen E and sixxen F (or unity A, unity B and so on). The nomenclature here adopted is thus divided into three main denominations (SIX-XEN, Sixxen, and sixxen) that are constituted by the same phonemes, but written differently and having, by consequence, different meanings referring each one to a specific aspect of the Xenakian instrument. From now, and because of the necessary instrumental development and constant attention on construction matters, the definition of terms such as prototype and model seem fundamental.

## A definition of prototype and model

It is important in the present discussion to emphasize definitions tied to the notion of "prototype" and "model" and necessarily required to differentiate Sixxens created in different conditions. Jensen, Özkil, & Mortensen (2016, p. 821) did a systematic literature review about the definition and characterization of prototypes in engineering design and product development. The authors affirm that the terms 'prototype' and 'prototyping' do not have commonly accepted definitions, referring to various artifacts and processes with different meanings, purposes, and characteristics. As defined in the Frascati Manual 2015 by OECD (2015, p. 60), "A prototype is an original model constructed to include all the technical and performance characteristics of the new product." Lim, Stolterman, & Tenenberg (2008) specify that prototypes are how learning, discovering, and/or refining could be generated and improved. In this way, a prototype could define a preliminary aspect of an object but also of a process or behavior from which other forms (of objects, processes, or behaviors) are developed, implemented, tested, varied, copied, or refined to accomplish a final and optimal product or service. As an important purpose, this final product or service has to

be reproducible and, in a broader way, of commercial interest. The final product or service is the main objective, and the prototypes are the intermediary steps to achieve it until a modification, improvement, or extensive change is required again. If modifications are made and the final product pass to have variations of itself, those variations could be considered models. A final product or the production of its models could require many different prototypes to be achieved; it generally occurs that for one final product, many viable prototypes are discarded. In most cases, the difference between viable prototypes and those discarded is a matter of practicality, viability, and choices; the difference between viable prototypes and a final product is primarily commercial.

As an intermediary element, the prototype has potential ties with the final product, but its scope is limited as a representation of part of the process to accomplish an object, it is not the final product. Lim, Stolterman, & Tenenberg (2008, p. 7) explain, "A primary strength of a prototype is in its incompleteness. It is the incompleteness that makes it possible to examine an idea's qualities without building a copy of the final design. Prototypes are helpful as much in what they do not include as in what they do." This is why many other stages potentially exist between a prototype and a final product. In the Frascati Manual (OECD, 2015, pp. 60-64), eight stages could be described to achieve a final product or service: prototypes, pilot plant, industrial design, industrial engineering and tooling up, trial production, pre-production development, after-sales service and troubleshooting, patent and license work.

In these perspectives, the development of prototypes is an initial step, and the subsequent ones are all turned explicitly to the potential large-scale production and commercialization. For the previous authors, the prototype is thus something made primarily to elucidate the potentiality and viability but not to be marketed. This aspect is changing considerably, and prototyping is receiving extra attention and allowing new perspectives. In this way, Jensen, Özkil, & Mortensen (2016, p. 821) affirmed that "The role and the importance of prototyping has been rapidly changing and progressing as emerging business models – such as crowdfunding and new digital fabrication technologies – directly influence engineering design and product development practices." This is why, even with an inevitable incompleteness, a prototype can be functional, having even a high level of complexity and finish, being also potentially as polished as it necessarily occurs in later stages of product development. Jensen, Özkil, & Mortensen (2016) describe the "validation prototypes" as a mature product category before committing to production is made. In these perspectives, the main differences between the terms "prototype" and "model" are necessarily tied to the commercial stages of the production and the interests surrounding it, not their functionality. While a prototype does not necessarily present commercial interests or is not in a business chain, the model is in itself a stage of production in which the product is already viable and ready for commerce, both being as functional

and finished as necessary and as possible.

Considering these previous specificities, it will be evident in the present discussion that the Sixxens created in different parts of the world are mainly validation prototypes (e.g., the Sixxen of Makoto Aruga Percussion Ensemble or the Synergy prototype), the reason why they will be mainly referred here as prototypes. The "prototypical characteristic" of a Sixxen is even something mentioned by Jean-Paul Bernard (artistic director of Les Percussions de Strasbourg for many years) when he stated: "I always had the impression that even if it's a work that has been played for many years, each time it was played Xenakis rediscovered it, in part because of the prototypical instrument."[28] (Barthel-Calvet, 2011b, p. 22). This prototypical aspect of the SIX-XEN is also primarily tied to Xenakis' own posture because, in the end, he did not bequeath a finished and defined ultimate product. For intentional reasons, he preferred to give constructors the liberty to achieve experimental representations of his idea, having a panoply of results. Those intentional reasons ended up creating an absence of a unique and exclusive Sixxen that should be imitated, and without it, many variations appeared, which is why highly diversified possibilities are thus currently observable.

The term prototype (equivalent here to validation prototypes) will be used in the present text to specify also the noncommercial approach that characterizes the largest number of Sixxens produced. A prototype is essentially an *étape* in a production chain that could improve the development of a final product, but it generally has no real commercial aptitudes. On the other hand, a model is a step in which the commercial interest is fundamental; it exists for that purpose. This last term will thus be used for specific Sixxens that were commercialized (e.g., the Hébrard-Abitbol model) or still are (e.g., the Lunason model, among others).

For Jensen, Özkil, & Mortensen (2016), prototyping in different industries and research conceptions serve different purposes. Thus, for them, "Industrial designers produce prototypes of conceptual ideas to explore form and geometry, engineers prototype designs to validate a functional principle or to benchmark performance, and software developers write prototype programs to test user experience or requirement specifications." (Jensen, Özkil, & Mortensen, 2016, p. 822). In the present discussion, the prototypical characteristic of the instrument will be highlighted as a continuous process of experimentation and research of sonorities involving different agents (the composer, the constructors, and the performers). It also has clear connections with hearing, and the development of a sensibility turned to minuscule aspects of the perception, where acuity is welcomed. In the end, the present discussion highlights a search by a composer (towards sonorities that could reinforce personal approaches, concepts and compositional structures), constructors (towards a

[28] "J'ai toujours eu l'impression que, même si c'était une œuvre jouée depuis des années, à chaque fois, Xenakis redécouvrait son œuvre, en partie à cause de cet instrument-prototype." (Barthel-Calvet, 2011b, p. 22).

convenient device) and musicians (towards an effectiveness of performative concepts, gestures, and interpretative skills). More than an interest exclusively motivated by an object and its material constitution, the discussion here highlights the interests in potential sounds, musical thinking, creative processes, and compositional approaches that manifestly motivated a large community.

## State-of-the-art about *Pléïades* (1978) and the SIX-XEN

Xenakis published varied texts (articles and books) and gave many interviews throughout his life, and the academic research tied to his work is very impressive. Solomos (1996; 2001a; 2022) discussed the production surrounding Xenakis and reunited a considerable number of publications written by Xenakis himself but which also described plenty of research about him. A consultation on the Iannis Xenakis official website (https://www.iannis-xenakis.org/articles-et-autres-ecrits-majeurs/) demonstrates an immense amount of texts (articles, books, and chapters) developed about the composer. Even though we are discussing a composer with many references, specific researches about *Pléïades* and precisely about the SIX-XEN are relatively scarce. Some academic references exist but rarely presenting a profound scope of discussion, and the description, data, and arguments are sometimes repeated from one to another.

In his publications, Xenakis did not specifically deal with *Pléïades* or the SIX-XEN concepts and construction aspects. He wrote, however, some books and texts that bring more details on the compositional aspects and mathematical theories used in this work and the aspects of his thinking surrounding the production of the piece. In this perspective, it could be mentioned the books *Arts/Sciences. Alliages* (Xenakis, 1979) and *Kéleütha* (Xenakis, 1994), as well as the articles "Sieves" (Xenakis, 1990), and "Determinacy and indeterminacy" (Xenakis, 1996). Extensive interviews with Xenakis produced a brief discussion about *Pléïades* and inferences about the SIX-XEN. Those interviews were published by Restagno (1988) and Varga (1996) or available as a radio show (Xenakis, 1989). Other interviews can bring certain elements contextualizing the production of the piece and the ideas mainly surrounding the period without directly mentioning the piece or the instrument, such as in Zaplitny (1975), Lohner (1986), Yoken (1990), Delalande (1997), Serrou (2003), and Takemitsu (2018).

Five texts are important to understand the subject in a general context and are tied to the composer's biography and main production periods. Fleuret (1988), Halbreich (1988), Solomos (1996), Harley (2004), and Gibson (2011) mention directly *Pléïades* presenting it from the perspective of historical characteristics and Xenakis' career. Thus, these texts explore a specific

correlative moment between *Pléïades* and his creative moment around the 1970s[29]. The authors treat many pieces and a great number of aspects. However, their publications do not have abundant data specifically tied to the SIX-XEN.

A potential connection between *Pléïades* and Indonesian music is generally based on a few elements and restrained to a sequence of pitches with similar intervallic structures to specific pentatonic scales in the «*Claviers*» movement. From this perspective, Mâche (1981) was the first to directly infer that a trip to Bali and Java in 1972 would have some potential consequences on Xenakis' works, mentioning *Jonchaies* (1977) and *Pléïades* exclusively as representative pieces of that. The author, composer himself, was Xenakis' friend, had a profound interest in Indonesian performative arts and exchanged with him about the traditions of this country, but never got any further about the subject. After this first mention, Halbreich (1988), Solomos (1996), Barthel-Calvet (2002b), Solomos (2002a and 2002b), Harley (2004), Gibson (2011), and Pires (2015) also addressed the issue but indicating only the presence of the pentatonic sequence in one movement. The only author that addressed it in more detail was Lacroix (2001), but she never really found direct connections in her analysis, inferring only about it in terms of inspirational materials. For her, the composer had a high esteem for Indonesian traditions, but he would not have gone beyond some indirect correlations. Here it will be shown that there is much more about it than previously addressed.

*Pléïades* was initially commissioned as a ballet and premiered in 1979 in the context of the spectacle *Le Concile Musical*. About the dance, Germinal Casado, who was the choreographer responsible, wrote a brief text about the ballet two years after its creation (Casado, 1981). In this text, he related the challenges of creating Xenakis' work and certain aspects that surrounded the ballet's premiere, highlighting the soloists who danced and some details of the interactions for the preparation of the spectacle. Later, the same author described similar aspects in his autobiography (Casado, 2007) and later in a book about the professionals he worked with (Casado, 2017), addressing Xenakis and the spectacle specifically. Fleuret (1988), already mentioned above, made a more extensive analysis of Xenakis' ballet works, inserting *Pléïades* and *Le Concile Musical* in the context of other compositions such as *Kraanerg* (1968-69) and *Antikhton* (1971), among many others. Harley (2014), that mainly addressed *Kraanerg*, stated about *Pléïades* that "Details of the first performance are unclear, but it appears that the performance took place at the *Opéra du Rhin*, home of the ballet company, but without assigned choreographer or dancers."[30] (Harley, 2014, p. 121). It seems strange that in 2014 so fundamental information could not be particularly accessible and presented in his

[29] Even if they did not describe *Pléïades*, Nouritza Matossian (1981; 2005) and Mâkhi Xenakis (2015; 2022) could be also mentioned as important references about biographical sources.
[30] "Les détails sur la première représentation sont troubles mais il semble que la performance a eu lieu à l'Opéra du Rhin, lieu de résidence de la compagnie de ballet, mais sans chorégraphe ni danseurs attitrés." (Harley, 2014, p. 121).

discussion, showing that maybe much more still needs to be addressed about this particular piece. In specialized magazines about dance, Gourreau (1979) and Hersin (1979) broadly presented the main principles of the spectacle *Le Concile Musical* in the same year of its premiere. In the same period, some newspaper critiques were also published by Michel (1979), Segalini (1979), Thorgevsky (1979), and Walther (1979).

In terms of analytical approaches, Barthel-Calvet (2000) analyzed specifically the rhythmic aspects of Xenakis' composition and highlighted numerous excerpts in *Pléïades* in her doctoral dissertation, summarizing some of these aspects in a later publication as a chapter (Barthel-Calvet, 2002a). In his master thesis, Porres (2007) addressed aspects of the microtonal composition by comparing Alois Hába (1893-1973), Ivan Wyschnegradsky (1893-1979), Harry Partch (1901-1974), Gérard Grisey (1946-1998) and Xenakis. *Pléïades* is mentioned as well as the SIX-XEN but in broad lines, focusing on its microtonal characteristics to compare it with other systems. Gibson (2011) discussed aspects of Xenakis' self-borrowing technique, mentioning the ties and connections that *Pléïades* presents with other pieces. Lacroix (2001) highlighted a historical contextualization of the work and analyzed specifically the movement «*Claviers*», conducting her discussion in parallel with aspects of the Indonesian performative arts. Marandola (2012) discussed the interpretative analysis of the movement «*Peaux*», pointing to performance energy and directionality aspects. Bogler (2017) presented, in his bachelor's thesis, a formal classification of sections in «*Métaux*», proposing it based on analytical tools assisted by computers. Ceuster (2021) also worked with this movement, but he eminently analyzed and compared the sonorities of different Sixxens using software of spectrographic analysis. Exarchos (2007) addressed the mathematical aspects of the sieve theory in several works by Xenakis. He thus analyzed the sieve that characterizes *Pléïades* and showed the interconnections it establishes with different pieces. Santana (1998) discussed aspects of the orchestration in Xenakis by conducting a comprehensive analysis of the composer's works to demonstrate that rhythmic and spatialization aspects are fundamentally conditioned elements of the timbre. She addressed *Persephassa* and occasionally included *Pléïades* in the discussion but never mentioned the SIX-XEN. Even with a interesting work about the timbre in Xenakis, the author did not address nor refer to his acoustic instrument.

Interpretative approaches and connections between Xenakis and the performance of the piece are addressed by Batigne (1981), who discussed personal aspects and particularities of the creation of *Persephassa* and *Pléïades*. He was a musician of the group Les Percussions de Strasbourg, and his text points to the relationship with the composer and some details of the first audition. This percussion ensemble also organized some publications and short articles summarily seeking to highlight some aspects of *Pléïades* and the SIX-XEN (Les Percussions de Strasbourg, 1986; 1991; 2021). Barthel-

Calvet (2011) interviewed Jean-Paul Bernard when he was the coordinator of Les percussions de Strasbourg and, at some point, they discussed the instrument and the work premiered by the group. Still about this ensemble, Nepodal (2020) presented a broad overview of its historical aspects in his bachelor's thesis, and the pieces its musicians premiered. He thus mentioned *Pléïades* and also the Xenakian instrument, but because of his main objectives were tied to the percussion group, he did not address profound aspects about it. Engelman (2010) addressed aspects of the Canadian creation of *Pléïades* with the presence of Xenakis.

Different mentions must be made in terms of historical aspects and creating a new repertoire with a Sixxen. Harris (2003) studied large percussion ensemble works composed from 1970-2000 in two parts. He worked on composition nominations from experts in the field of percussion ensemble literature, and he analyzed instrumentation, form, melodic and harmonic function, meter and rhythmic language, as well as performance and rehearsal issues relevant to each of the most mentioned pieces. *Pléïades* is included in his list, but the author did not address more considerations about it in the discussion. Silva (2017) discussed the relationship between composer and performer and commissioned a new piece for Horn and a Sixxen. He presents some aspects of the Xenakian instrument in terms of the local development of a specific prototype in Brazil. In a brief passage of his book, Mâche (2018) commented on some personal exchanges between him and Xenakis and particularities in the choice of instruments as reciprocal influences, emphasizing the use of the SIX-XEN in one of his pieces.

Specifically, about the construction of Sixxen, the article by Reed (2003) is an important reference and is the first to propose a construction plan. This text explained the principles announced by Xenakis and examined, in a practical way, how to achieve them. The author focused mainly on design, materials, and technical specificities to the completion of the object more than the potential performance aspects that could be originated from it. This is quite the same for subsequent authors such as Melo, Lins, & Morais (2017), in an article about the construction of frames for percussion keyboard and SIX-XEN, Lins (2017) that worked in his bachelor's thesis on a dampening system for a specific Sixxen, and Melo (2022), who worked in his bachelor's thesis on the development of a Sixxen. Bogler (2017), that produced a synthetic analysis of «*Métaux*» as previously mentioned, also incorporated an interview with a constructor with whom he worked to develop the specific prototype of the *Zürcher Hochschule der Künste* (ZHdK). In terms of a discussion addressing the construction of a Sixxen, the most complete text was produced by Gueib (2020) in his bachelor's thesis. The author worked on a Sixxen developed with Xenakis, the Hébrard-Abitbol model; he initially analyzed the physical and acoustic characteristics of the model using computer modeling. After that, in exchanges with the musicians of Les Percussions de Strasbourg, he developed a new model for them based on

the technical needs of the ensemble. In these texts, much more emphasis is put on practical construction aspects than on performative aspects that are consequences of construction choices. In this perspective, there is no profound discussion about the potential implications that some performative choices could determine in constructing a specific prototype.

In terms of a broader overview of the SIX-XEN, Morais, Chaib, & Oliveira (2017) elaborated a review of prototypes and discussed, in a superficial way, aspects of Xenakis's relationship with the ensemble Les Percussions de Strasbourg for the first audition of *Pléïades*. They presented a unique review about Sixxens heretofore. However, because they did not access archival materials and documents, the historical aspects duly based are scarce and not appropriately addressed, with many prototypes missing. In terms of repertoire, Morais & Araújo (2019) highlighted some aspects of Sixxen pieces with electroacoustic interaction. Morais, Chaib, & Oliveira (2020) presented an interesting overview of the repertoire for the SIX-XEN, but these authors did not consider many pieces. Bucur (2022) presented a broad overview of percussion instruments. In her discussion, she then addressed organological and acoustic specificities of some metallic instruments in the subchapter "New Percussion Instruments", where she presented some details of the SIX-XEN. The description missed some details expressed by Xenakis himself, and there is an interest in an acoustic description that is very specific to one prototype, lacking a broader description of the other possibilities.

Reviewing those references, it is noticeable that many aspects are not deeply discussed and that a certain amount of information is recurrent, repeatedly emphasized from one publication to another. From a broad perspective, there are missing aspects that could point to the composer's life (as personal and professional ones), the piece, and the instrument. Xenakis' initial studies and sketches for the concept of a new instrument have not been reviewed and analyzed. An important part of his experiences with Indonesian music was never addressed, and this, unfortunately, seems to not match with the importance that this material presented in his work from the second half of the 1970s on.

The analysis of *Pléïades* was restricted to some movements separately; a complete understanding of the piece integrating its different parts was not previously made. In terms of the compositional approaches of this work, no publications discussed the initial documents and drafts in a specific and in-depth way, the analysis of the piece in its entirety has not been carried out, and little attention was given to «*Mélanges*». Profound connections between those aspects and the Xenakian thinking and compositional approaches were also not considered. The comprehension of the instrument in the context of the whole piece was not the subject of discussion. It was also rarely considered what in this particular creative process could be consequential to Indonesian music traditions by direct connections with Xenakis' previous experiences and exchanges.

A profound understanding of the SIX-XEN, according to Xenakis' thinking and compositional

approaches, is still missing, and what this instrument reveals about the composer's imaginary and creative process was not addressed yet. In this perspective, the prototypes that the composer developed or those with which he had minimal contact were not profoundly discussed. A historical perspective gathering the percussion ensembles that have worked to build a prototype was still not completely covered. The constructors and musicians who have exchanged with him have not been interviewed, and their experiences were not recorded or saved. A previous review was made, but the discussion context is incomplete, with some important prototypes missing. The same occurs with the information regarding the repertoire developed for the instrument; a previous article addressed it, but many important pieces were not indicated.

## Methodological approaches

To achieve a broad scope on the subject and to elucidate numerous specific points, a challenging perspective is imposed by the multiplicity of the phenomena. The gathering of different constructed Sixxens, composers, constructors, interpreters, concepts, and practices are intricated aspects defying coherent methodological approaches and analytical perspectives. As Johnston (2016, p. 82) stated specifically about practice-based research in musical instruments:

> An additional implication of accepting the fact that defining musical expression is problematic is the recognition of the problems of 'evaluation.' Essentially we have two choices: either take a position that for the purposes of evaluation musical expression will be explicitly defined in order to assess the instrument/interface's effectiveness; or accept that evaluations should become broader 'studies' that simultaneously consider the characteristics of the instrument, the creative practices of those who use it and the mechanisms that link the two.

Taking into consideration that the subject is a complex amalgam of agents and objects, thoughts and practices, as well as expectations and accomplishments, the present text is established based on four main thematic axes: 1) historical aspects of Xenakis' life tied to the creative process of *Pléïades* and his acoustic instrument; 2) definition, conceptualization and characterization of the SIX-XEN (in terms of the objects constructed, the specific repertoire and the notation developed); 3) the piece *Pléïades*; 4) perspectives for performance and artistic practices. These four axes are then divided into the eleven chapters presented here. The historical aspects are mainly addressed, pointing to Xenakis' interests in and contacts with Indonesian traditional music and instruments (Chapter 1), the premiere of *Pléïades* (Chapter 2), and prototypes of the SIX-XEN (Chapter 9). The primary characterization of the SIX-XEN concept and its correlations with Xenakis compositional approaches is presented in Chapter 3. The instrument as an object and the diversity of the constructs created is highlighted in Chapter 10, its repertoire in Chapter 11, its notation in part of Chapter 3 (as the Xenakian types of notations developed, Subchapter 3.2) and part of Chapter 11 (as the post-Xenakian types of notations,

Subchapter 11.2). The specificities of *Pléïades* that point to how the instrument was inserted in a musical context and which elements could connect it with the Indonesian traditions are presented in Chapters 5, 6, and 7. With the previous elements discussed, it is then necessary to contextualize how it could directly implicate artistic decisions in terms of performative possibilities. These practical aspects are addressed in Chapter 8, where the personal musical development of the present research is also highlighted.

To achieve this discussion, different methodological approaches were implemented. Broadly, various primary and secondary sources were consulted, demanding each one a specific tool for data collection of eminently qualitative aspects. In this perspective, archives were consulted, an in-depth review of prototypes and repertoire was realized, informants considered crucial were interviewed, and a complete artistic development was projected.

**Archives research**

The personal consultation of documents was possible through visits to the *Collection Famille Iannis Xenakis*, *Bibliothèque nationale de France* (BnF), *Bibliothèque musicale La Grange-Fleuret* (BLGF), and *Centre National de la Danse* (CND), all in Paris, as well as archives of Les Percussions de Strasbourg, in Alsace (France). Consultation of digitalized documents and online materials occurred in the *Opéra National du Rhin* Archives, *Institut national de l'audiovisuel* (INA), *Centre Iannis Xenakis* (CIX), Polish Music Information Centre (POLMIC), *Internationales Musikinstitut Darmstadt* (IMD), Archaeology of the Final Decade (AOTFD), New Music Concerts (NMC), and *Ksyme* Archives (KSYME-CMRC). Through the orientation of the owners themselves, there was also access to the personal archives of Claude Ricou, Gabriel Bouchet, Georges Van Gucht, Germinal Casado[31], and Ruud Wiener (the first three being all musicians that created the piece, the fourth the choreographer of the premiere, and the last one a musician that exchanged directly with Xenakis).

Archival research is the fundamental source of the discussion in Chapters 1, 2, and 9, and it also brought an essential basis to the aspects of the analysis (Chapters 5, 6, and 7) and the overview of prototypes and repertoire (Chapters 10 and 11).

**Interviews**

Knowing that musicians who contacted Xenakis exchanged with him and constructed a Sixxen at the end of the 1970s and all 1980s were still alive, the present research work had a certain sense of priority to record these experiences and memories as primary sources through interviews. The same interest was turned to the composer in the Xenakis' friendship circle that could highlight aspects of

[31] The consultation of Casado's personal documents was possible through the kindness of Giulio Ragnoli.

the same period of the composer's life. It is certain that information is tied to human memory and feelings in this situation, susceptible to change with time. However, because primary sources about the historical perspectives of the SIX-XEN were scarce, a considerable number of interviews were established to search for more details about the initial stages of its development[32]. Recordings about this specific moment as perceived by different agents and the access to the experience of these persons seemed thus a fundamental contribution of the present research work.

Two kinds of interviews were applied to achieve this methodological aspect: unstructured interview (open conversation) and semi-structured interview. Different stages tried to create more ties with the respondent and capture many memories and information. In this perspective, the contacts were mainly realized in 3 essential moments: first contact, the first meeting (an open conversation in an unstructured interview), and the first interview (a semi-structured interview with an elaborated questionary). When it was possible to have more meetings with the respondent, complementary interviews (a mix of open and semi-structured interviews) were specifically planned.

The first contact with respondents could take place personally, via phone, email, or social networks. At this moment, the project's interests and intentions were presented, and a specific encounter and interview were asked for. After that (and depending on the respondent's possibilities, demands, and agenda), a first meeting or interview was planned. The first meeting was planned in case the person wanted to understand the project implications better. These meetings were at the respondent's request (this first moment could be recorded or not, according to the respondent's choice as well). After this first stage, a second meeting was sought to conduct the interview directly linked to the SIX-XEN and *Pléïades*. When possible, new interviews were scheduled for the continuity of contact with the respondents and for new questions if any clarification became necessary.

In terms of respondents, a broad overview of persons was thus consulted, as indicated in Appendices 1 and 2. They represent mainly musicians of ensembles who worked to construct a Sixxen, independent percussionists who performed the piece, composers who worked with the Xenakian instrument, and constructors. Appendix 1 shows specifically the interviews realized with mainly primary sources. Those persons seemed fundamental to be interviewed here to contribute to understanding the emergence of the new instrument within the Xenakian approaches. Appendix 2 presents the contacts that occurred by email about the subject, being less represented by primary sources. The secondary sources were also considered here because they are essential elements to understanding the *a posteriori* interest for such an instrument. These exchanges by email were, in a certain way, of a practical nature and addressed to musicians for questions about interpretation, their approaches developed on *Pléïades,* and the commission of new pieces or to constructors for technical

[32] As Weiss (1995, p. 2) mentioned, "Interviewing rescues events that would otherwise be lost."

questions about their specific prototype. Thus, the interviews helped the constitution of Chapters 1, 2, 3, 4, and 9 and greatly helped the overview of prototypes and repertoire (Chapters 10 and 11).

**In-depth review of prototypes and repertoire**

To have the broadest list possible of Sixxens constructed and its specific repertoire with the largest amount of information about each one of the prototypes and pieces, an in-depth review was produced. It sought to collect diverse data from the most different origins, such as from bibliographic resources, periodicals, websites, phonographic and audiovisual records, concert and event programs, composing notes, social media, and diaries, and journals, letters, reviews of recordings and journal critiques. This extensive review was also complemented by documents found in the previously mentioned archives. Chapters 9, 10, and 11, mainly based on a mix of primary and secondary sources from this in-depth review. Here, based on a large overview of sources, the broader overview about the instrument and its repertoire is realized heretofore.

**Practice-based research**

The previous approaches were complemented here with practice-based research focusing on using the SIX-XEN in different contexts. As Rolling (2010, p. 107) stated, “A work of arts-based research innovates in its assumption that research can be performed. The performative aspect of arts-based research may be demonstrated in a range of mediums and modalities”. Between these modalities, the author mentioned dance, painting, and poetry, among others, but practice-based research is not an exclusivity of the arts being also potentially conducted in “many disciplines involving professional accreditation, among them engineering, architecture, health care, education, law, and social work.” (Aho, 2013, p. 66).

The Part III of the present research work is based on practice, and it was here developed as a source of knowledge not accessible by the previous methodological approaches. It will be apparent to the reader that Xenakis searched for the active role of the percussionist in constructing his instrument and, sure, its use and application in diverse contexts. In this perspective, something was essential for him in terms of the experience and knowledge from the practice to achieve the totality of his musical object. Thus, an important part of the present discussion was imagined as a consequence of the performing act. This was necessary to experiment with diverse situations and experience part of the knowledge in different artistic conditions, in a sort of refined contact with different perspectives of the subject focused. As stated by Hutchens *et al*. (2018), “Framing research as practice-based can stimulate new ways of producing knowledge, yet conversely [...] practice-based research can offer new ways of conceptualizing the legitimacy, sufficiency, and adequacy of

research."

What was of interest during the practical approach here was the organization of concerts and the confrontation to a repertoire (past and actual) that could exemplify the aspects being reviewed on archives, discussed theoretically, and analyzed. Performing it was a knowledge-bearer act, here eminently present to make the musical material accessible through other communication channels, those not accessible via the previous methodological approaches. When Rolling (2010, p. 107) discussed what he called the topic "Arts-Based Research as Performative Practice", he stated that:

> To perform anything, even one's own identity, is to carry out an action with the intent to present it to an audience. To perform research is to carry out a critical intent as presented to an audience of peers and/ or the public who share an interest in the research problem. It matters not whether the researcher is posing questions about the perception of a phenomenon, explaining a phenomenon through a rich and analytical description of its qualities, or experimenting with a phenomenon in a hands-on intervention engaging its limits and possibilities.

In this statement, it is clear that numerous perspectives are possible, not having a unique way to do it and necessarily having to make choices. As Achari (2022) stated, "To begin with, there is no one way of conducting artistic research, like there is no one way of doing research in general." The author used the term "artistic research," and differentiation seems necessary. As considered, between practice-based research and artistic research, the first dimension in terms of applicability is comparatively clear. While the first is much broader and, as previously mentioned, can be adopted in varied fields (such as architecture, engineering, health sciences, business, marketing, and so on), the second one is tied explicitly to the arts. An important aspect of understanding both approaches, being the main one here considered, is connected to the methodological aspects and the focus on the validity and the results. The practice-based, being more open, absorbs the knowledge of the practice and the participation in the process to do, execute something, and collect the data from this experience of practice. As Aho (2013, p. 65) complements, "In the ongoing conversation within art academies, art-based research, also known as practice-based research, practice-led research and practice as research, refers to the idea of artistic practice, as it is traditionally understood, as a legitimate form of research in which some of the resulting knowledge is embodied in an artifact." Having the experience of the practice as a method, almost all new research is a new situation, being hardly reproducible because not necessarily based on a method with a specific protocol. It is also because of the different domains in which it can be applied that it is intended to be experienced.

In practice-based research, an original investigation is always organized to accrue new knowledge through the practice, its outcomes, and consequents; the phenomenon is experienced, and the results are the validation. As Schwab (2013, p. 6) stated, "the question to be asked is not whether the artist is also a scientist or vice versa, but what material and practical ground can be suggested for experimental research of any kind and how this research is conditioned by and develops into the

various epistemic contexts within which it is situated." Thus, in these perspectives, the present research was more concerned about the experience in itself, why an emphasis on different concerts and the relationship with varied composers while commissioning new pieces was necessary to experiment with diverse situations.

The methodological frame that focused on artistic issues sought to consider three main interpretative aspects regarding the present subject: the piece *Pléïades*, the use of the SIX-XEN, and the correlations of both with Indonesian traditions. They were conducted considering the data, analysis, and discussion treated by the other methodological aspects at the same time that they also contributed on a practical perspective to the understanding and expansion of the whole discussion. The connections greatly inspired the constitution of a repertoire centered on the instrument with references to Indonesian music. The constant dialogue between tradition and avantgarde approaches (something that, as it will be clear all over the present text, enormously interested Xenakis in the production of the piece and conception of the instrument), as well as between past and present repertoire, were the main points to search for experiences and knowledge guided by practice. From the musician's point-of-view, the principal aim of this practice was to consider how those elements could bring a coherent imaginary that could enlighten Xenakis' premises, stimulating other creative processes and aesthetic interests. At the same time, from the point-of-view of the musicologist, it was searched for connections that would help to understand the theoretical aspects of the research as a whole, highlighting elements hardly perceptible by other perspectives.

Part III presents specifically the practical aspects of the research, being based on four concerts organized according to the main aims of the dissertation. The concerts were designed to highlight both historical aspects of the repertoire (through previous pieces with the SIX-XEN) and innovative ones (new repertoire created through commissions). Commemorative aspects have also been considered in the artistic choices concerning the instrument and the composer. The four organized concerts had as main thematic objectives:

1 – Reviewing and performing the previous repertoire using a Sixxen, marking the 40 years of the instrument's creation (with one new piece).

2 – Connecting a Sixxen and gamelan instruments (three new pieces).

3 – Performing exclusively new commissions using Sixxen (with five new pieces).

4 – Overviewing Xenakis' production for percussion ensemble and celebrating the centenary of the composer (no piece commissioned).

During the commissioning of pieces, when the composers exchanged about the instruments, two different proceedings were adopted: the presentation of the SIX-XEN and the presentation of gamelan instruments. The first always occurred, and the last was only applied when an explanation

about the specifics of this Indonesian instrumentation was necessary. To present the SIX-XEN, two approaches were used. The first one aimed to describe the Xenakian instrument broadly. Its main characteristics, the diversity of sonorities, the difference between prototypes, and the notation aspects were thus highlighted with a series of examples sent to the composer (recordings, videos, and links). After that, the second approach was explicitly tied to the Sixxen available for the concerts (a model developed by Lunason in Basel). The model to be used was then presented, and different sonorities and playing techniques were exposed. After that, the composers received a recording in a professional studio with all 114 notes divided into six unities of this specific Sixxen model (organized from A to F with three different dynamics in a recording section of the Live Ableton[33]). They also received a classification table with all frequencies and indications of range.

When the presentation of the gamelan instruments was necessary, two ways to proceed were adopted; when the personal presentation was not possible (because of the pandemic mainly), a video call was organized. The presentation described a general characterization of the Indonesian instruments and traditions (name, ranges, mallets, playing techniques). If the composer would test different sonorities and techniques, live was the moment to do it, and if he/she asked for later, a video was sent with what was asked (occurring many times, as well as with the Sixxen also). The composers also received texts about the gamelan in general and its notation (based mainly on Tenzer, 2000) and a list with the description of pitches and ranges of the specific instruments of the gamelan ensemble Saraswara Gong Kebyar of the Musik-Akademie Basel, available for the concert.

Exchanges also occurred during the creative process because the composers generally demanded more specifics about the Sixxen or the gamelan. Sometimes they asked for a test of a specific sonority, and experiments of different types were produced to fulfill their requirements.

All the previous stages described were thus tied to the composers and the stimulation of their creative process. However, access to the gamelan instruments was also necessary for the musicians playing the repertoire. To that, three steps were necessary, first, a general presentation of the gamelan practices (by Profs. Martin Winter, Sara Andreacchio, or Sigrid Winter, responsible by the Saraswara Gong Kebyar); second, weekly-based classes and encounters for improvement of general gamelan techniques, and last, a more intense set of encounters nearing the concerts working specifically with the pieces to perform.

[33] All the 114 sounds were organized synchronizing attacks of the same bar to all the six unities, allowing different possibilities of perceiving the sonorities of the specific Sixxen. This organization with the software Ableton Live allowed the hearing of each bar individually, the sequence of 19 bars of each unity exclusively, the six unities together to a common bar, or yet the complete sequence of 19 notes executed by the six unities. With this organization synchronizing attacks, it was also easily possible to hear the sound of any internal subgroup of unities for some specific sequence (e.g., only the sixxens A, B and C, or only sixxens A and F, or C and D, and so on). Each bar was recorded in three different dynamics (*p*, *mf* and *f*) also giving a better perception of all previous possibilities and sonorities in relation to the parameter of intensity.

Considering the previous points, a broader overview can emerge, and a larger understanding of Xenakis' work with the percussion community can be available. The roles he played seem very different and dynamic in the search for a new instrument. The limits were always blurred by the fact that the own conceiver/composer/creator/stimulator/researcher to imagine and use this instrument was always willing to experiment with a new model that would best represent his concepts and the practical needs of his work. Johnston (2016, p. 82) also treated the ample proportions that this kind of connection between an object and artistic phenomena can take, stating that:

> When we give a new instrument to an artist, or create one for ourselves, we have the opportunity to ask a number of questions. If we take the position that musical expression is stable and unproblematic, then we can simply ask how well or how badly the instrument supports it. However, if we instead are open to the idea that musical expression is contingent and dynamic, we can begin to examine the relationship between this new instrument and the artist's personal approach to expression. In addition to considering its effectiveness at supporting the creative work of the artist, we are also able to use the instrument/interface as a kind of probe or provocative prototype to explore the nature of that work for that artist at that time.

Xenakis was a composer who weaved such a deep relationship with new timbres; he always expressed the necessity of constant research in music and approaches that construct dialogues between sciences and arts. He was stimulating and developing tools to work on micro and macroscopic layers in creating sounds for almost all of his career. Understanding the only acoustic instrument he created seems thus fundamental and could lead to new insights into his artistic production and creative process[34]. Understanding the interconnections between an instrument, the composer that created it, and the piece for which it was imagined is a multi-layered task that can certainly bring fundamental contributions to performance.

It will always be difficult to precisely delineate the theoretical, practical, philosophical, mathematical, physical, acoustic, historical, and sociological aspects of Xenakis' work. His production is a complex result that amalgams many different layers due to the masterpieces he composed. In this sense, the present text traces different aspects that could lead the clues to a broad and eclectic environment surrounding the composer during his creative process towards *Pléïades*. This piece has five introductory paragraphs, and the SIX-XEN was briefly described in two. It is sometimes hard to catch the real intentions in Xenakis' mind because some questions were never addressed to him, and the replies he gave when asked were sometimes vague. In different moments of the present discussion, some excerpts describing the instrument and some statements about the piece will be used repeatedly, sounding quite repetitive. However, the constant return to some specific phrases is important to highlight how the synthesis power in Xenakis' first presentation has a

[34] From a complex composer such as Xenakis, at least the comprehension of a specific period of time or particular stages of his artistic production.

multitude of clear guidelines (technically speaking) and inspiring elements (in terms of artistic possibilities and creative development of a prototype) presenting, in the end, a strong internal coherence. The present text will show how this power of synthesis has allowed diverse perspectives in the practical and performative approaches of many ensembles while always remaining one consistent musical object.

# Part I – On the origins, history, and concepts

# Chapter 1. Origins of the SIX-XEN: the initial role of Indonesian music

*La question de l'échelle est la base de toutes les musiques.*
*Chaque culture a ses propres instruments qui produisent des échelles différentes.*
*Iannis Xenakis* (Takemitsu, 2018, p. 345).

Iannis Xenakis' statements in the introduction of the score of *Pléïades* point to potential ties with non-Western music and extra-European traditions. He affirmed: "after a long trial, I constructed a series (scale) which, surprise!, was similar to the scales of ancient Greece, of the Near East, or of Indonesia"[1] (Xenakis, 1979, p. i). It is also noticeable that some reports on the piece and the Xenakian instrument described aspects and characteristics similar to Indonesian music for a baseline comparison. This kind of analogy has been made and repeated quite often, and countless definitions and descriptions of both *Pléïades* and the SIX-XEN have assimilated this defining trait. The program notes of the premiere (tied to the ballet spectacle *Le Concile Musical* but also the instrumental version premiere) could be considered the first mention of this comparison, immediately followed by different critiques in journals such as *Le Monde* (Michel, 1979) and *Le Matin* (Segalini, 1979), among others. After this first moment tied to the piece's premiere at the end of the 1970s, many other texts repeatedly described the instrument and *Pléïades* in this way. The musicians who worked with Xenakis used this kind of comparison when describing the general sound of the piece and the Sixxen specifically built. On the website of Les Percussions de Strasbourg, for example, it is mentioned that[2]:

> Listening to the sixxen in «*Métaux*», one immediately thinks of the gamelan of Indonesia, especially those from Bali, the instruments used in festive music in Japan, the chimes of churches in the Mediterranean basin, and the cowbells of the Alps (Les Percussions de Strasbourg, n.d.).

Jean-Paul Bernard (artistic director of the group for many years) stated about the Sixxen that "It is a metallophone made up of 19 blades that are not tuned in a tempered way and that come close to a gamelan"[3] (Barthel-Calvet, 2011b, p. 22). By e-mail exchange, he reiterated the same aspect adding that "Xenakis had an idea of a very particular instrument, sounding a bit like 'the gamelan orchestras', very rich in harmonics and with third-tone tunings"[4] (Jean-Paul Bernard, email to author,

[1] Why did the composer express such concern in a description of an avant-garde ballet piece? How does this seem congruent with his compositional work? Could this statement allow something about the SIX-XEN and its particularities to be inferred? The present chapter will establish some connections in order to point to the answer of these questions that will be a continuous process in all this dissertation. More details are thus accessible in Chapters 6, 7 and 8. The original statement is: "après beaucoup de tentatives, je construisis un crible (échelle) qui, surprise!, se rapprochait des gammes de la Grèce antique, du Proche Orient, de l'Indonésie." (Xenakis, 1979, p. i).
[2] This statement has been used by Les Percussions de Strasbourg since at least 1989. It firstly appeared in the CD booklet of the second recording of *Pléïades* (by the label Denon in 1989), being after that a description constantly reiterated.
[3] "C'est un métallophone constitué de 19 lames qui ne sont pas accordées de manière tempérée, et qui se rapprocherait d'un gamelan." (Barthel-Calvet, 2011b, p. 22).
[4] "Xenakis avait une idée d'un instrument particulier, sonnant un peu comme « les orchestres de gamelans » très riche en harmoniques et avec l'accord de 1/3 de tons." (Jean-Paul Bernard, email to author, March 30, 2015).

March 30, 2015). Many recordings provide similar descriptions of those aspects in their booklets, including recordings from Les Percussions de Strasbourg, Les Pléiades Ensemble, and Kroumata Percussion Group[5]. They also use Xenakis' text in the score's introduction (mentioned above), reinforcing the composer's own words on the topic.

In the context of academic discussions, some authors mentioned the presence of aspects originally from Indonesian music in several of his works[6]. They generally try to encourage a broader understanding of the subject, but very few focused on the various contacts that Xenakis established with Indonesian performative arts. Few studies focused on how it could have impregnated some of his pieces, and no work discussed his only trip to Indonesia in depth. Viewing it from a historical perspective that associates his personal experiences, career, and production, it is possible to observe that the connections are not trivial. They could explain ties linking different pieces and approaches toward the second half of the 1970s and the beginning of the 1980s (a period that represents a transition between important phases of his work).

This chapter discusses elements that preceded the composition of *Pléïades,* and that could explain certain aspects of the initial concepts of the SIX-XEN. It is necessary to consider why and how a ballet piece and an instrument created in the late 1970s by an avant-garde composer such as Xenakis has ties with gamelan music and aspects of Indonesian performative arts. In this way, it is worth noting that diversified elements, directly and indirectly, caught the composer's attention in many different periods of his life. Some elements are tied to a period far before the piece's composition and will include information regarding Xenakis' life between the 1950s and the early 1970s. They allow an interesting way of understanding how Xenakis' production in the 1970s represented an immense change in his compositional practice—something that, among other aspects, is directly connected to his only journey to Bali and Java in 1972-1973. Even though it is a daunting challenge to summarize such a diverse and complex cultural system with intense impacts on Western music, some generic aspects of gamelan music have to be described here because, more than anything, it is necessary to understand the musical phenomena that Xenakis encountered in this country.

Indonesia has many cultural elements that are part of a large and broad spectrum of social constructions. Diversity is a notorious aspect in the complex system that imbricates the arts, society, religions, economy, and history due to the human occupation of the Southeast Asian archipelago, a

[5] All of these groups had direct contact with the composer and exchanged with him for their premieres of his percussion pieces. Les Percussions de Strasbourg premiered *Persephassa*, *Pléïades,* and *Idmen A B*. Sylvio Gualda (director of the Les Pléiades) premiered *Psappha*, *Rebonds*, *Aïs*, *Komboï*, and *Oophaa*, to mention only some of the most important, and was a great friend of Xenakis. Kroumata premiered *Zythos*. They certainly had Xenakis' consent to release the text in the CD booklets, showing that he was consciously allowing those terms to be used and those concepts to be diffused.

[6] As, e.g., in Mâche (1981), Halbreich (1988), Solomos (1996), Lacroix (2001), Barthel-Calvet (2002b), Solomos (2002a and 2002b), Harley (2004), Gibson (2011), and Pires (2015).

region also extremely variegated in terms of its natural resources, environment, flora, and fauna. Concerning the social groups and languages, it is also perceptible that diversity is key to understanding the country. There are hundreds of distinct ethnic and linguistic groups, Javanese being the most widely used language[7]. However, a feeling of unity seems to strongly draw many of these aspects onto a common ground, which makes possible the present reality of a consolidated nation.

Xenakis was conscious of the aspects that characterize this integrated society, of which music is a fundamental day-to-day element. In an interview for the radio program "*Musique à Bali*" for France Culture on March 29, 1973 (just a few months after his return from Indonesia), he emphasized the sociological aspects of music in Indonesia:

> It is a unique place because art is a function integrated into society, it is something alive. It's not during leisure time, nor during some very scattered parties, but it's practically daily. It's every day, and it's in all the villages, and the most important thing is that it's related to work, it's related to witchcraft, magic, love, everything. And the history too, because they tell the history, the religion, everything through music, through dance, because there are both[8] (Xenakis, 1973).

The phrase "*Bhinneka Tungal Ika*" is mentioned in an ancient 14th-century poem and is present in many of the national elements that constitute the Indonesian democracy (such as the National Constitution, the National Symbol, and the National Motto). *Bhinneka Tungal Ika*, which can translate as "different, but of the same kind," "many, yet one," or even "unity in diversity," is considered "the basis of the Indonesian identity" (Tobing, 1962, p. 3) and is applied in cosmological, religious, or anthropological points of view to explain the Indonesian social fabric, cultural expressions, and integration with nature.

*Mutatis mutandis,* the gamelan, is also a manifestation of unity in diversity. It is sometimes even difficult to define, as it is considered a generic term that could comprise diverse concepts in a complex amalgam. In its local meaning, the term could define, for example, a certain type of instrument, groups of instruments, groups of diverse origins and musical traditions, a specific musical production, potential or finished compositional materials that are mainly instrumental repertoire (but that could also potentially include singers). Gamelan mainly describes music but also relates to the artistic constellations that integrate dance and/or theater. It is a broad term that can permeate diverse cultural manifestations but always includes a form of musical expression from the Indonesian islands and other Southeast Asian countries.

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[7] As Spiller (2004, p. 49) better specifies, "Indonesia includes thousands of islands [...] and as many as 300 language and ethnic groups."

[8] "C'est un endroit unique parce que l'art est une fonction intégrée à la société, c'est quelque chose de vivant. Ce n'est ni pendant les loisirs, ni pendant certaines fêtes très éparses mais c'est pratiquement quotidien. C'est quotidien et c'est dans tous les villages et le plus important c'est que c'est lié avec le travail, c'est lié avec la sorcellerie, la magie, avec l'amour, avec tout. Et l'histoire aussi, parce qu'ils racontent l'histoire, la religion, tout à travers la musique, à travers la danse parce qu'il y a les deux." (Xenakis, 1973).

McPhee (1966, p. 24) refers to the origin of the term and affirms: “The word gamelan, from the Javanese word, *gamel*, to handle (*gambel*, Bal.), appears in the fourteenth-century historical work, *Nagara Kṛtagama*, but in a context which seems to refer to a single instrument with keys of either wood or metal”. What can be included in the definition of a gamelan set is that the gathering of different groups of instruments, tuning aspects, and possible timbral associations are all considered part of an ensemble. The instrumentation of the gamelan is quite variable and depends on the presentation’s social context or the availability of instruments. These aspects depend on geographical, historical, and sociopolitical aspects. The gamelan set predominantly comprises percussion instruments, but it can also incorporate multiple other options, such as bowed string instruments, wind instruments, and singing.

Javanese and Balinese musical traditions impacted several significant composers who began composing differently after experiencing it. The Western musical aspects specifically connected with Indonesian traditions appeared later than other cultures[9] but are a fundamental key to understanding part of the transition between the end of the 19th and 20th Centuries. In this way, the 1889 World’s Fair in Paris (originally *Exposition Universelle* in French) was an important event that changed many European artistic perspectives. With more than 32 million entries between May 6 and November 6, 1889, this exposition was the most significant event of the 19th century (Revol, 2000, p. 14) and impacted the arts and, more broadly, the European society as whole.

Since there was space for the exposition of specific countries, different cultures from all over the globe were represented. A *kampong*[10] called “Javanese village” (*Village Javanais* in French) represented Indonesia throughout the event (Fig. 1.1a). Music, dance, puppet theater (from the Sundanese tradition called *Wayang golek*), and batik techniques were performed daily and demonstrated (more details in Chazal, 2002). The music was essentially instrumental and presented by a parade group of anklungs (Fig. 1.1b) that essentially conducted the public to the gamelan performance accompanying the dancers (it seems that saron, bonang, jenglong, kendang, gambang, gender, rebab, suling and tarumpet were essentially the instruments incorporated)[11].

[9] Here could be mentioned, e.g., Henry Purcell’s *The Indian Queen* (1695), Jean-Philippe Rameau’s *Les Indes galantes* (1735), or Wolfgang A. Mozart’s *Die Entführung aus dem Serail*, K.384 (1782).

[10] *Kampong* is the Indonesian term to village. The houses in the Javanese *kampong* of the World’s Fair 1889 came directly from Java and with enough certainty, the majority of the participants came from Sunda, Western Java (Chazal, 2002).

[11] An image of the anklung group is known (Fig. 1.1b) but, because only drawings remain about the gamelan, one can wonder about the type, complete instrumentation and size. But, with different iconographic sources, it seems that it was a relatively little group playing a Sundanese pentatonic *salendro* set (*salendro* is the Sundanese term originating from *slendro*). For more specifics see Chazal (2002) and Spiller (2004).

**a)** **b)**

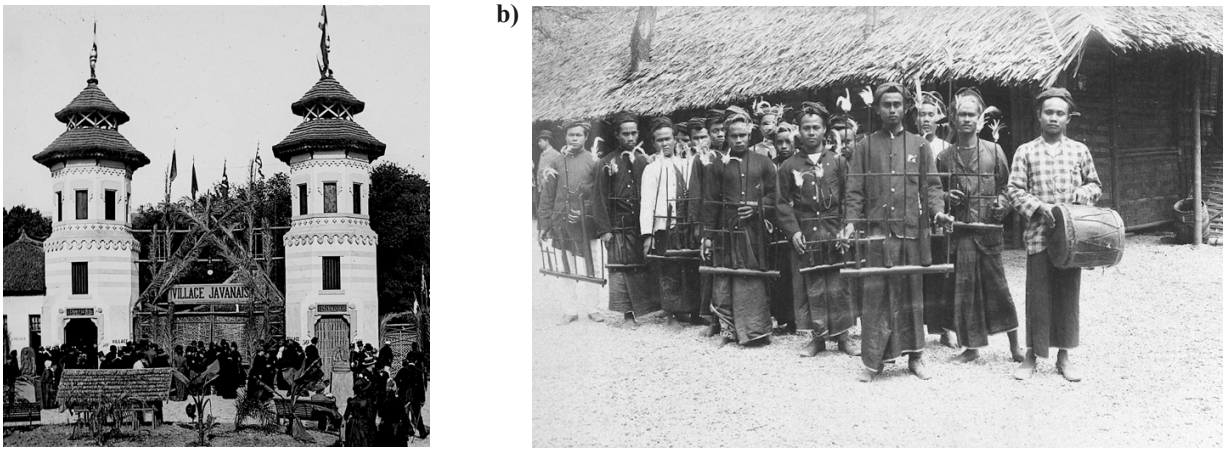


***Figure 1.1***. Javanese village in the World's Fair 1889. **a)** Main entrance. Source: Henry Clay Cochrane Collection (COLL/1) at the Marine Corps Archives and Special Collections (MCASC). **b)** Anklung group playing on parade. Source: Digital collection Southeast Asian & Caribbean Images (KITLV) at the Leiden University Libraries.

The specific performances that occurred there would be accessible to many important figures of the Parisian artistic society and had perceptible consequences[12]. As Revol (2000, pp. 80-81) stated, "Debussy went almost daily to the *kampong* [to see the spectacles], alone or with his friends, Godet, Dukas, Judith Gautier..."[13] Not only Debussy (aged 27 years old at the time), the composers and the poet mentioned, but also Maurice Ravel (aged 14 years old), Camille Saint-Saëns, and many other artists, such as Paul Gauguin, went to this specific space at the 1889 World's Fair. Those presentations changed the perspectives of many composers impacting their later musical production. As stated in 1913 by Debussy and reprinted in the 1970s: "Nevertheless, Javanese music is characterized by a counterpoint that would make Palestrina's one seems like a child's play. And if we listen without European prejudices to the charm of their 'percussion,' we have to admit that our own music is not much more than a barbarous kind of noise more fit for a fairground circus."[14] (Debussy, 1971, p. 223). Ravel would also reiterate this deep interest and reverence. In an interview in 1931, he expressed that he was using structural materials collected from these Southeastern traditions: "I am eager to visit the land of the gamelan. I consider Javanese music to be the most elaborate in the Far East, and I often borrow themes from it: « *Laideronnette* », in *Ma Mère l'Oye*, with the temple bells, comes from Java, both harmonically and melodically. Like Debussy and other contemporaries, I have always been particularly fascinated by musical orientalism [underline added]."[15] (Ravel, 1989, p. 361).

[12] Actually, it is very clear that this was not the first gamelan presentation in Europe. The first one seems to point to a concert that occurred in Amsterdam in 1883 (more information can be found in Spiller, 2004). What can be stated with certainty is that a greater number of composers had access to gamelan performances during the Universal Exposition of 1889 and that, for a portion of them, the experience was crucial for their production.

[13] "Debussy se rend presque quotidennement au *kampong*, seul ou avec ses amis, Godet, Dukas, Judith Gautier..." (Revol, 2000, pp. 80-81).

[14] "Cependant, la musique javanaise observe un contrepoint auprès duquel celui de Palestrina n'est qu'un jeu d'enfant. Et si l'on écoute, sans parti pris européen, le charme de leur « percussion », on est bien obligé de constater que la nôtre n'est qu'un bruit barbare de cirque forain." (Debussy, 1971, p. 223).

[15] "Oui, j'ai hâte de voir le pays du gamelan. Je tiens la musique javanaise pour la plus élaborée d'Extrême-Orient, et je

Olivier Messiaen, a fervent admirer of the two previous French composers, expressed his interest in Indonesian music many times. He visited the Colonial Exhibition of 1931 in Paris (*Exposition coloniale internationale* in French) and experienced the live performance of different Eastern ensembles. The hearing of the gamelan ensemble would have such a vivid impact on him that he explicitly mentioned it in his *Traité de rythme, de couleur, et d'ornithologie*:

> "It was at the 1931 World Exhibition in Paris that I first saw and heard Anak Agung Gede Mandera, his Balinese orchestra, his dancers and his dancers from Bali. [...] But the rhythms of the gongs and drums and the *moto perpetuo* of the xylophones, as heard in the 'Legong', a dance for three young girls [...], this typically, classically Balinese effect, were to leave an indelible memory in me. This is what we find in several of my works (*Vingt Regards*, *Petites liturgies*) and especially in *Turangalîla*."[16] (Messiaen, 1995, p. 154).

He would return to these references on many occasions (as addressed by Boivin, 1995; or Balmer, Lacôte, & Murray, 2017), including during some classes Iannis Xenakis participated in, as will be soon addressed. Even though it is a daunting challenge to summarize such a diverse and complex cultural system with intense impacts on Western music, some generic aspects of gamelan music had to be described here because, more than anything, it is necessary to understand the musical phenomena that Xenakis paid some attention to. A much more detailed characterization of the Indonesian musical traditions can be consulted in McPhee (1966), Kunst (1973), Tenzer (2000), Spiller (2004), and Tenzer (2011), to mention a few authors. The characterization of Balinese and Javanese music is also challenging, as each deserves a complete discussion[17]. However, because Xenakis visited both islands in 1972-1973 and heard the music of both regions, a discussion of both styles will be explored here to situate the composer's thinking. It is thus important to consider many aspects of Xenakis' life to understand what directly and indirectly connects *Pléïades* and the unique acoustic instrument he created to Indonesian music. These connections began around the 1950s (as expressed by the composer himself), represented decades of interactions (mainly through recordings, but also through live concerts and exchanges with friends and specialists), and materialized in live experiences during a specific trip to the country in 1972-1973. This is why the aspects of Xenakis' contact with gamelan music will be essentially divided into two parts from here: *ex situ* interactions

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lui emprunte souvent des thèmes : « *Laideronnette* », dans *Ma Mère l'Oye*, avec les cloches du temple, provient de Java, aussi bien harmoniquement que mélodiquement. Comme Debussy et d'autres contemporains, j'ai toujours été particulièrement fasciné par l'orientalisme musical." (Ravel, 1989, p. 361).

[16] "C'est à l'Exposition mondiale de 1931, à Paris, que j'ai vu et entendu, pour la première fois, Anak Agung Gede Mandera, son orchestre balinais, ses danseurs et ses danseuses de Bali. [...] Mais les rythmes des gongs et tambours et le *moto perpetuo* des xylophones, tels qu'on les entend dans le « Legong », danse pour trois jeunes filles [...], cet effet typiquement, classiquement balinais, devaient laisser en moi un souvenir ineffaçable. C'est lui qu'on retrouve dans plusieurs de mes œuvres (*Vingt Regards*, *Petites liturgies*) et spécialement dans *Turangalîla*." (Messiaen, 1995, p. 154).

[17] A discussion about Indonesian music is a task that cannot be carried out in a few pages; even an entire life of research specifically about musical manifestations in one island or the other would be limited in this regard. This is why it is important to read the discussion of the characterization of gamelan music presented here as a limited and partial introduction to a diverse, rich and multiform culture that presents number of performative arts traditions.

(mainly his background interests and many exchanges that permeate twenty years before the trip to Bali and Java) and *in situ* experiences (the journey to Indonesia).

## 1.1 Xenakis' ties with Indonesian music: *ex situ* interactions

The *ex situ* interactions will be described here in a chronological sequence, and elements that were part of the early stages of Xenakis' career and equally permeated part of different compositional phases will be highlighted. They will be divided by focusing on 1) first contacts, 2) Messiaen's classes, 3) the festival East-West Music Encounter, 4) the international symposium Musics of Asia, 5) the Shiraz Arts Festival, and 6) other sources and exchanges predating the trip.

### 1.1.1 First contacts (Paris, beginning of the 1950s)

Xenakis arrived in France as an exiled in November 1947. He was then twenty-five years old, an engineering graduate from Athens Polytechnic, and a former World War II combatant who had fought against German and British occupation and was sentenced to death by the Greek dictatorship[18]. He brought a few personal belongings from Greece, and the initial intention was to briefly stay in Paris before leaving for the USA in search of a permanent location. A few years after his arrival, the young composer Xenakis (then an employee of the architect Le Corbusier) was searching to diversify his musical references broadly. He was trying to absorb references from around the globe, which Paris—as a cosmopolitan capital and cultural crossroads—allowed him to do[19]. When Varga asked in 1980 about his compositions in his first years in Paris, Xenakis expressed:

> In my loneliness and isolation, I tried to hang on to something—after all, my old life and new circumstances, my old image of the world and the new experiences, all these were in conflict. I wanted to find out who I really was. In that process, traditional Greek folk music appeared to be a safe point, and I was also interested in Greek church music, as well as the folk music of Romania and other nations. As far as Greek folk music was concerned, I relied partly on my memory and I also listened to records and read books (Xenakis, 1996, p. 26).

[18] Xenakis fought against German Nazis (occupying Greece from 1941 until 1944) and, after that, the previously allied Britannic army (1944-1945). He was initially in pacific manifestations and joined the nationalist movement protesting against the Nazi occupation but he joined the Communist Party and the armed struggle after that. When the British crown's attempted to seize power over Greece and Winston Churchill decreed martial law demanding the deposition of weapons by military and paramilitary groups, Xenakis further entrenched himself in the armed struggle and was severely wounded in a near-death event (January 1945). The death sentence came in 1947 and the exile to France the same year. More details about this period of his life can be consult in Varga (1996), Solomos (1996) and Matossian (2005), among others.

[19] As Matossian (2005, p. 58) expressed about this period, "In 1950 Xenakis was already twenty-eight years old, with little technical experience of composition and a poor, highly eclectic background in music history. He found himself among far younger musicians who had already had works published and received performances. They were on their way to artistic maturity while he floundered with teachers who marked his compositions like a schoolboy's exercises. For all his remoteness, Le Corbusier sensed Xenakis' dissatisfaction and contrived to offer hints and advice which proved invaluable." She also continued to describe the first encounter with Messiaen in the same period, stating that "he had first met Messiaen in 1951 and he must have been struck by the man's kind, modest, and gentle manner. It must have been encouraging to the young man who was beginning to despair of finding a path to composition" (Matossian, 2005, p. 59).

The search for Greek references mentioned here was occurring in parallel with a search for significant references in traditions from other countries because, as stated by himself in an autobiography: "in the 1950s, I discovered non-European music, from India, Laos, Vietnam, Java, China, and Japan. I suddenly found myself in a world that was my own. At the same time, Greece appeared to me in a different light, as the crossroads of the survivals of a very ancient musical past."[20] (Xenakis, 1980, p. 221). This interest in musical traditions from many different places, particularly Indonesian music, started in the 1950s and was always correlated to Greece in his mind, as was mentioned several times after this period. It was, for him, a seminal period of his formation as a composer and human being. A consideration that he stated in 1973 (a few months after the journey in Bali and Java) exemplifies it:

> As far as I'm concerned, I've been in the Far East for 20 years and for very simple reasons; it's because Greece, with its traditional music, is still quite close to all these traditions, from India, from the Near East, and eventually even much further away, as far as Japan, it's so natural. And I had the chance to study Hindu music already 20 years ago; I didn't wait for the current fashion[21] (Xenakis, 1973).

Indeed, this global view about non-European music and avant-garde tendencies is not exclusive to Xenakis' thinking in the 1950s. Different avant-garde composers in the same period were trying to connect themselves and their approaches to Eastern music (in terms of instrumental choices, texture, timbre, or formal aspects), and it was a discussion widely adopted in the circles in which Xenakis was (whether in his friendships circles or professional relations). The inclusion of the music of the "Other" as an element of rupture with the *status quo* and the establishment in power (be it artistic/musical or sociopolitical) was an evident approach related to composition in general. Olivier Messiaen, when interviewed by Samuel (1986, p. 212) expressed that "These [extra-European] musics have played a great role in my own music. And also for Pierre Boulez, who was enthusiastic about Balinese music"[22]. In a 1999 interview with Bruno Serrou, the composer Betsy Jolas (who traveled with Xenakis to Indonesia) addressed the same aspect and stated that "We were all fascinated by the notion of time in Oriental music. My whole generation was even obsessed with it"[23] (Serrou, 2001, p. 120). Recently, she also added that:

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[20] "[...] dans les années 50, j'ai découvert les musiques extraeuropéennes, de l'Inde, du Laos, du Vietnam, de Java, de Chine et du Japon. Je me suis trouvé tout à coup dans un monde qui était le mien. En même temps, la Grèce m'apparut sous un autre jour, comme le carrefour des survivances d'un passé musical très ancien." (Xenakis, 1980, p. 221).

[21] "En ce qui me concerne ça fait 20 ans que je suis en extrême-orient et pour des raisons tout à fait simples, c'est parce que la Grèce avec sa musique traditionnelle est assez proche encore de toutes ces traditions, des Indes, du proche Orient et éventuellement même beaucoup plus loin, jusqu'au Japon, c'est tellement naturel. Et j'ai eu la chance d'étudier la musique Indoue il y a déjà 20 ans de ça, je n'ai pas attendu la mode actuelle." (Xenakis, 1973). He is probably defining as the "current fashion" the minimalist currents in vogue at the moment (even though their origins date back to the 1960s).

[22] "Ces musiques ont joué un grand rôle dans ma propre musique. Et aussi chez Pierre Boulez qui s'est enthousiasmé pour les musiques balinaises" (Samuel, 1986, p. 212).

[23] "Nous étions tous fascinés par la notion du temps de la musique orientale. Ma génération entière en a même été obsédée." (Serrou, 2001, p. 120).

> At that time, there were many things, there was the Musée de l'Homme, but everyone was interested... starting with Boulez too... You can hear it in *Le Marteau sans Maître* [1954], for example... He certainly listened to many recordings that were available at the time... It was indeed our discovery of the time, I remember very well, even for me![24] (Jolas, interview by author, 2021).

Thus, at the same period, Xenakis drew parallels between traditional Greek music and his interest in non-Western music and started to find his own way of composing based on mathematics and architecture. Concerning Indonesian music expressly, the composer affirmed:

> I already knew the music of Bali [before traveling to Indonesia in 1972]. The first time I got to know this music was from a Japanese record made during the war, when they had occupied Indonesia, and Mayuzumi[25] had that record, and I was in Paris at the time. There was a whole collection of music from Southeast Asia, including Bali, and it made a very big impression on me. In fact, it was one of the most beautiful pieces I've ever heard. And so, this time [with the trip, it] was to get a closer look and to hear it[26] (Xenakis, 1973).

The first contact with gamelan music had a great impression on the composer. As he stated, it was "one of the most beautiful pieces" that he had ever heard, showing the great esteem that he attributed to the sonorities and formal aspects of this music even twenty years later. However, in a different statement (an interview from December 1997), the composer pointed to a different first hearing[27]. He went on to indicate the 1950s, but he then pointed at Schaeffner[28] as a primordial agent in his first contact, mentioning: "[...] I went to the Trocadero with André Schaeffner, who introduced me to the music of Bali, Java, Japan. That was in 1950"[29] (Serrou, 2003, p. 42). Regardless of which version should be considered more accurate (but it is more suitable to consider the interview in 1973 rather than the second one in 1997 because of the temporal proximity to the facts), both show that: 1) the 1950s are a prolific moment in his search of music from all over the globe, 2) the first contacts

[24] "À ce moment-là il y avait beaucoup de choses, il y avait le musée de l'homme mais tout le monde s'y intéressait... à commencer par Boulez aussi... Ça s'entend d'ailleurs dans *Le Marteau sans Maître* par exemple... Il a certainement écouté beaucoup d'enregistrements qui étaient disponibles à l'époque... Ça a été en effet notre découverte de l'époque, je me rappelle très bien, y compris pour moi !" (Jolas, interview by author, 2021).

[25] A reference to Toshirō Mayuzumi, a Japanese composer and pioneer of *musique concrète* and electronic music who went to Paris in 1951 and studied at the Conservatoire National de Paris (CNSM) from 1951 to 1952. Xenakis thus probably heard Gamelan with him around this period. More details about Mayuzumi can be consulted in Utz (2018).

[26] "Je connaissais déjà la musique de Bali. La première fois que j'ai eu l'occasion de connaître cette musique c'était d'après un disque japonais fait pendant la guerre, quand ils avaient occupé l'Indonésie et c'était Mayuzumi qui avait ce disque et j'étais à ce moment à Paris. Il y avait toute une série de musique du Sud-Est asiatique dont de Bali et ça m'avait fait une très grosse impression. D'ailleurs, une était une des plus belles pièces que je n'aie jamais entendues. Et donc cette fois-ci c'était pour voir de plus près et d'entendre." (Xenakis, 1973).

[27] Assembling different statements (even if they are sometimes contradictory) could show different aspects of Xenakis' memories about this period. It could also make inferences in different directions possible. Statements that are made closest to the year of the fact in question could be considered more related to its veracity. However, as it will soon be clear, both memories can better elucidate a panorama in which the composer acted in many distinct ways.

[28] André Schaeffner was an important French researcher and ethnomusicologist. He directed the department of ethnomusicology of the Musée de l'Homme (formerly the Musée d'ethnographie du Trocadéro) and was also responsible for the entire musical collection. His approach and point of view influenced Xenakis in many ways—this is why the works of Schaeffner will be connected as references in specific parts of the present work.

[29] "[...] j'allais au Trocadéro chez André Schaeffner qui m'a fait découvrir les musiques de Bali, de Java, du Japon. C'était en 1950." (Serrou, 2003, p. 42).

with Indonesian music occurred around that period, 3) a powerful impression and esteem stayed marked in his memory.

A tape (Identifier: DONAUD 0602 218–Xenakis 223) found in the *Bibliothèque nationale de France* (BnF–National Library of France) could be one of the first recordings of gamelan music that Xenakis possessed (Fig. 1.2). The recording was part of his personal belongings, having Xenakis' handwritten indication on its cover "Folklore: Sion Java Sum. Bali. Viet. Thib. Volta Gabon. [Date:] XII–1951", that describes thus the countries from which each type of traditional music came. It is a collection of eleven recordings, primarily of Asian music (from Siam–actual Thailand–, Java, Sumatra, Bali, Vietnam, and Tibet), but includes African music (Haute Volta–actual Burkina Faso– and Gabon). The labels with the respective timing indicate their origins (Fig. 1.2c).

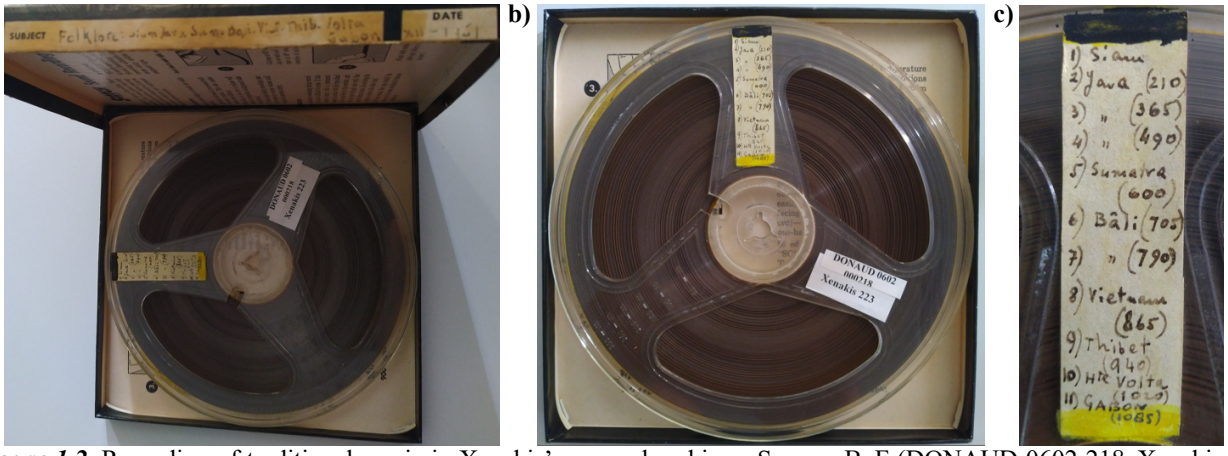


***Figure 1.2***. Recording of traditional music in Xenakis' personal archives. Source: BnF (DONAUD 0602 218–Xenakis 223). Photos by the author.

This is potentially the first gamelan recording that the composer mentioned because of the date indicated on the cover (XII–1951). It is unclear if this material is a recording of the collection of music from Southeast Asia (at least the first three-fourths of the tape) that his friend Toshirō Mayuzumi presented to him or if it is from the collection of the Musée de l'Homme under the responsibility of André Schaeffner. In any case, the date (1951) corresponds precisely with the period described previously and with what he had stated. Furthermore, this shows that it was a recording that he always kept with him and that remained in his collection throughout his whole life, attesting to his interest in the material (something that will return as an important part of the composition of *Pléïades* in Chapter 7).

Lacroix (2001, pp. 14-15) contradicts both of Xenakis' statements (about Mayuzumi and Schaeffner) when she affirms that Olivier Messiaen "makes him discover, through hearing and analysis, traditional music from Asia, and especially Balinese gamelan." She reiterates this several times and also states "that the composer had the opportunity to hear *in situ*, during trips to Indonesia

made from 1966, and which then seems to have strongly marked his musical imagination" (Lacroix, 2001, p. 54). There are some mistakes in her argument because Xenakis did not travel to Indonesia starting in 1966; the only trip was made in 1972-1973, as will be specifically discussed here. In 1966, the composer traveled to the Philippines to present a lecture at the International Music Symposium (also specifically discussed below). Moreover, her statement about Messiaen's classes as Xenakis' first contact with Indonesian music cannot be confirmed. Her text's lack of evidence puts in question a so directive affirmation, even though some other resources (mainly observation of indirect evidence) could support it[30]. Messiaen was personally interested in extra-European music, and—as a composer, teacher, and friend—his thinking, perspectives, and ways to compose impacted many aspects of Xenakis' life, as discussed in the next section.

### 1.1.2 Messiaen's classes (Paris, 1951–1954)

With auditor status, Xenakis studied with Messiaen between 1951 and 1954 (the first class seems to have been in September 1951, and the last was undoubtedly on July 6, 1954, according to Notebook 9 consulted in the *Collection Famille Iannis Xenakis*). Xenakis acknowledged that Messiaen was a crucial agent in his independence and self-esteem as a composer[31], and he expressed: "Messiaen's example has taught me that I can do whatever I like, without any restrictions, provided, of course, that what I want is interesting" (Varga, 1996, p. 32). As stated by Barthel-Calvet (2013, pp. 175-176):

> Beyond simple friendship, much can be learned from considering the intellectual connections that formed between these creative personalities during two periods in particular: Xenakis's time as an auditor in Messiaen's class at the Conservatoire from 1951 to 1954 (a period that

[30] As stated by Boivin (1995, p. 342), "Later testimonies indicate that even after the recording techniques, the development of ethnological sciences, and a certain fashion for oriental philosophies that had contributed to enlarging the field of knowledge in this domain, Messiaen's class remained one of the rare places of traditional teaching in France where the richness of non-Western musical cultures was spoken of freely, without condescension." Original text: "Les témoignages plus tardifs nous indiquent que même après que le disque, le développement des sciences ethnologiques et une certaine mode pour les philosophies orientales eurent contribué à agrandir le champ des connaissances en ce domaine, la classe de Messiaen est demeurée l'un des rares lieux d'enseignement de type traditionnel en France où l'on parlait librement, sans condescendance, de la richesse des cultures musicales non occidentales." (Boivin, 1995, p. 342).

[31] Many authors corroborate this aspect that Boivin (1995), Matossian (2005), Solomos (2008), and Barthel-Calvet (2013) pointed out. Solomos (2008, p. 1), for example, stated that "Iannis Xenakis rarely spoke about the influences he may have been under. It is true that he liked to present himself—and his commentators do him good, most of the time!—as an *ex nihilo* creator: The notion of demiurgy, of radical creation, is specific to his vision of the world. His relationship with Messiaen, however, constitutes an exception to his unacknowledged affiliations." Original text: "Iannis Xenakis s'est rarement étendu sur les influences qu'il a pu subir. Il est vrai qu'il aimait se présenter – et ses commentateurs le lui rendent bien, la plupart du temps ! – comme un créateur ex nihilo : la notion de démiurgie, de création radicale, est propre à sa vision du monde. Son rapport à Messiaen constitue cependant une exception à ses filiations non reconnues." (Solomos, 2008, p. 1). Boivin (1995, p. 112) stated specifically that: "Curiously, the two students on whom Messiaen's influence is recognized to have been decisive, in the early fifties, stayed in his class only as auditors. Like Karlheinz Stochausen, Iannis Xenakis displayed an outstanding creative personality from the outset [...] and quickly acquired a solid reputation in the European avant-garde milieu." Original text: "Curieusement, les deux élèves sur lesquels l'influence de Messiaen est reconnue pour avoir été décisive, au début des années cinquante, ne séjournèrent à sa classe qu'à titre d'*auditeurs*. Tout comme Karlheinz Stochausen, Iannis Xenakis manifesta d'entrée de jeu une personnalité créatrice hors du commun [...] et acquit rapidement une solide renommée dans le milieu d'avant-garde européen." (Boivin, 1995, p. 112).

> coincided with a drastic evolution in Xenakis's musical style that calls for a re-evaluation of the impact of Messiaen's teachings on his music), and later, during the 1960s, when Xenakis embarked upon an ambitious theoretical project to study what he called 'outside-time structures' (in which he considered Messiaen's work and thought as a critical historical turning point).

For her, specific compositional approaches and tools of these two composers could, in some fashion, be considered similar, such as their ways of employing additive rhythms, serial techniques, and permutations. As she explains: "Both composers shared the practice of a rhythmic writing based on a succession of note-lengths, as well as a taste for mathematical games and the abstract organization of rhythmic values using interversions or the Golden Number" (Barthel-Calvet, 2013, p. 193). It is also possible to perceive common affinities and aesthetic preferences in other aspects, such as great respect and even "reverence" for traditional music from all around the world, their studies of Indian rhythms, and their specific interests in Japanese theater music, among others non-European traditions.

Messiaen (Samuel, 1986, p. 192) stated about his teaching activities that: "the analysis of the works of the masters, [...] exotic, ancient, and ultra-modern music: these analyses were the main work of my class."[32] Boivin (1995) pointed out that in the early 1950s, although Messiaen gave classes on analysis, he did not treat Indonesian or gamelan music specifically. He would only address this more precisely in 1958–1959 (at least as officially described in his class notes consulted by Boivin). On the other hand, Messiaen himself expressed:

> I remember talking about music from Bali and playing gamelan music. I never thought this could be useful at any time to Boulez. But it turned out that he wrote *Le Marteau sans Maître* with its orchestration of vibraphone, percussion, tam-tam. It is not exactly gamelan but came out of it. It was not intended, but happened because Boulez heard that music in my class when he was young (Matossian, 2005, p. 60).

Boulez was Messiaen's student in harmony classes for just one academic year—between 1944 and 1945—and composed *Le Marteau sans Maître* in 1954. Messiaen influenced him and often interacted with Schaeffner, which appears in the letters they exchanged (Boulez & Schaeffner, 1995). As Boivin (1995, p. 341) added:

> At the beginning of his teaching career, Messiaen's interventions on these "other" musics seem to have been essentially aimed at introducing the students to an unheard world of sound. He made them listen to records, explained certain basic principles, and commented on the instrumentation. On a few occasions, he took his class to the Musée de l'Homme for a visit of the instrument collection. Later on, his approach would intensify and he would call upon, as far as possible, specialists, whom he sometimes found among his own students.[33]

[32] "l'analyse des œuvres des maîtres, [...] des musiques exotiques, antiques et ultra-modernes : ces analyses furent le travail principal de ma classe." (Samuel, 1986, p. 192).

[33] "Au début de sa carrière de professeur, les interventions de Messiaen sur ces musiques « autres » semblent avoir eu essentiellement pour but d'introduire les élèves à un monde sonore inouï. Il leur fait écouter des disques, explique certains principes de base et commente l'instrumentation. A quelques occasions, il amènera sa classe au musée de l'Homme pour une visite de la collection d'instruments. Plus tard, sa démarche s'intensifiera et il fera appel, dans la mesure du possible,

When visiting the Musée de l'Homme, Xenakis seems to have done precisely what Messiaen sometimes did with his classes and recommended to some students in the same period. In this way, Jean Prodromides, who studied with Messiaen between 1946 and 1948, confirmed having heard gamelan music for the first time with Messiaen and stated:

> I discovered in his class the gamelan and the *kecak* of Bali, a little bit of Tibetan music, and of course Hindu music, which no one knew about (only he would go and look at that closely). I remember being pushed a little bit by Messiaen [to explore this side]. I remember going to the Musée de l'Homme, seeing Gilbert Rouget who was curator at the time, and hearing seventy-eight rpm records of Balinese gamelan.[34] (Boivin, 1995, p. 339).

Prodromides highlighted thus some specific approaches of his master in the second half of the 1940s. Because Messiaen was doing that during this period, it could be entirely imaginable (even if Boivin affirmed that it was not officially described in Messiaen's class notes from the 1950s) that this was a usual subject of discussion in his classes. Instead, it was more a topic for short discussions or for listening to recordings during parts of lessons than a subject of two or three full classes. What is certain is that Messiaen did not repeat subjects from one year to the next. He always tried to renew his objects of study, including some topics of potential interest to the students according to their own needs and demands[35].

Xenakis' class notes (consulted at the *Collection Famille Iannis Xenakis*) do not indicate any entire class about Indonesian musical structures (though this repeatedly happened with Indian music). The few mentions connect to the analysis of *Turangalîla-Symphonie* (1946-1948), in which Messiaen used groups of instruments and timbres inspired by sonorities that he currently associated with those of the gamelan, as he explained and described on other occasions. In Xenakis' notes, this is evident in three specific passages (tied to the movements «*V. Joie du sang des étoiles*», «*IX. Turanglîla 3*», and «*X. Final*»). As part of an analysis of «*IX. Turanglîla 3*», Xenakis wrote specifically on page 60 of Notebook 9:

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à des spécialistes, qu'il trouve parfois parmi ses propres élèves." (Boivin, 1995, p. 341).

[34] "J'ai découvert à sa classe le gamelan et le *keçak* de Bali, un peu la musique tibétaine, sans oublier bien sûr la musique hindoue, que personne ne connaissait (il n'y avait que lui pour aller regarder ça de près). Je me souviens avoir été un petit peu poussé par Messiaen [à explorer de ce côté]. Je me rappelle avoir été au musée de l'Homme, avoir vu Gilbert Rouget qui en était conservateur à l'époque, et avoir entendu des disques soixante-dix-huit tours de gamelan balinais." (Boivin, 1995, p. 339).

[35] In an interview with Claude Samuel, when asked if he used the same theme twice in his courses, Messiaen replied: "In principle, no. However, at the request of the students, I repeated my courses on Gregorian chant, Greek metrics, and the deçî-tâlas of India almost every year. For the rest, I did not follow a cycle with return, and I avoided repetitions. I must also say that the theme of the year did not depend entirely on my imagination, nor was it imposed on me. When I arrived on October 1st, I had a few ideas, without being sure of my choice; it was the students' faces that decided. [...] The subject of the year was therefore decided according to the people I had in front of me." Original text: "En principe, non. Cependant, à la demande des élèves, j'ai recommencé presque tous les ans mon cours sur le chant grégorien, la métrique grecque et les deçî-tâlas de l'Inde. Pour le reste, je n'ai pas suivi de cycle avec retour, et j'ai évité les répétitions. Je dois dire aussi que le thème de l'année ne dépendait pas entièrement de ma fantaisie et qu'il ne m'était pas non plus imposé. Quand j'arrivais, le 1er octobre, j'avais quelques idées, sans être bien sûr de mon choix ; c'est le visage des élèves qui en décidait. [...] le sujet de l'année était donc décidé en fonction des personnes que j'avais en face de moi." (Samuel, 1986, pp. 195-196).

> 6 2nd variation
> Superposition of the main theme in equal arches to the gamelan celesta timbres vibra[phone].
> Piano other rhythm of the same theme
> Onde [Martenot] augmentation forming a new phrase.[36]

Concerning «*X. Final*», on page 63 of the same notebook, he wrote:

> 6 development of the 1st theme in G + chord theme.
> flute and gamelan mode 4
> alternate impulse
> quartet contrary movement[37]

The term "gamelan," as used by Messiaen, is a kind of instrument association that characterizes the gathering of percussion keyboards (generally, marimba, xylophone and/or vibraphone). For example, Messiaen stated[38], concerning *Turangalîla*:

> The keyed percussion comprises a glockenspiel, a celesta and a vibraphone. These three instruments, combined with the solo piano and the metal percussion, form a small orchestra within the large orchestra, with a sonority recalling the gamelan of Bali. (The Javanese orchestra, or gamelan, also used on Bali, notably includes of course several xylophones and metallophones, large gongs, sets of bells, small gongs, and long drums, or kendangs.) (Messiaen, 1991, p. 11-12).

He returns to the same kind of comparisons many times in this piece. He stated about the «*Introduction*» that "After a solo piano cadenza comes the body of the movement: this superposes two rhythmic ostinatos in the woodwind and the strings, a gamelan, and a fourth level where chords in the brass and the piano alternate and answer each other." (Messiaen, 1991, p. 12). For him, «*Turangalîla 1*» is characterized by a "Second theme on low trombones, with a gamelan of celesta, glockenspiel, vibraphone, and piano superimposed." (Messiaen, 1991, p. 13). Furthermore, regarding «*Turangalîla 3*», he expressed that "In this strange movement, besides a melodic theme superimposed on itself in multiple variations distributed among the piano, gamelan, ondes and woodwind [...]" (Messiaen, 1991, p. 15). He is no more referring to the instrument by name but by this group of timbres that he calls "gamelan." Compared with Xenakis' note about «*Turangalîla 3*», it is perceptible that both descriptions have some parallel, meaning that Messiaen's discourse about it stayed quite the same over the years. This correlation between percussion keyboards and Indonesian inspiration is thus recurrent in Messiaen's imaginary. Interviewed by Boivin (1995, p. 339), he even stated that all percussion keyboards would have Indonesian origin[39]:

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[36] "6 2eme variation / Superp. thème principal en arches égales au gamelan celesta timbres vibra. / Piano autre rythme du même thème / Onde augmentation formant nouvelle phrase." (Iannis Xenakis, Notebook 9, p. 60).
[37] "6 développement 1er thème en sol + thème d'accord. / flûte et gamelan mode 4 / poussée alternée / quatuor mouvement contraire" (Iannis Xenakis, Notebook 9, p. 63).
[38] Messiaen's description of *Turangalîla* is accessible in his *Traité de rythme, de couleur, et d'ornithologie* (Messiaen, 1995) and in the booklet of the recording made by Deutsche Grammophon (Messiaen, 1991).
[39] This is currently known to have no literal support in historical sources. The origins of the vibraphone, the marimba and the xylophone in the context of craft or industrial production in the West involve much more details than a simple loan or cultural appropriation from Indonesia. However, it is important to emphasize here the universalism of thought of the composers of that time (especially composers such as Messiaen, Boulez and Xenakis, who interacted and exchanged

> I introduced it to young composers, especially because of the sounds, the use of metallophones. At that time, there was not yet a great school of percussion in France, but there was Felix Passerone who had introduced us to the vibraphone, the marimba, and later the xylorimba, all these keyboard instruments that were very popular with young people and which I was the first to use. But all this came from Bali.[40]

Those are some of the many situations surrounding the figure of Messiaen and Indonesian music; much more could be described[41]. This specific use of the "gamelan" returns in numerous other pieces (*Couleurs de la cité celeste*–1963, *Saint François d'Assise*–1975-1983, to mention a few examples). The dense constellations that correlate other concepts and notions seem very typical of how Messiaen would describe them during his classes. It seems that this was so regular that it is strange that Xenakis did not have more notes about this kind of commentary.

Xenakis studied with Messiaen in the same period, during which he mentioned beginning to hear non-Western music and searching for information at the Musée de l'Homme. The recordings of Javanese and Balinese music in his personal collection (Identifier: DONAUD 0602 218–Xenakis 223, BnF) was reproduced by him after the beginning of his studies with him (as handwritten "XII–1951" in its cover). Although he certainly owes a lot to Messiaen's teaching, he did not seem to attribute any special mention to the first presentation and hearing of Indonesian music by the master. One thing is certain: even though direct references to Indonesian music are not very present, this amalgam of the sounds of avant-garde music and traditional music from around the world was typical of Messiaen, and it became an actual, practical procedure for Xenakis. In Messiaen's class, he would develop his tools and compositional skills and broaden his aesthetic affinities and the dimensions of his analytical listening. As Solomos (2008a, p. 3) reinforces, "It is probably thanks to Messiaen's courses that Xenakis acquired a musical culture: Messiaen specialists would undoubtedly be interested in the substantial notes that Xenakis sometimes took during these courses, notes that can be found in the Xenakis Archives."[42]

This search understanding of music from the most varied regions of the world and the exploration of their particularities in a compositional context of the transgression of Western norms

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experiences on countless occasions).

[40] "Je l'ai fait connaître à mon tour aux jeunes compositeurs, surtout pour les sonorités, l'emploi des métallophones. A cette époque-là, il n'y avait pas encore une grande école de percussion en France, mais il y avait Felix Passerone qui nous avait fait découvrir le vibraphone, le marimba, et plus tard le xylorimba, tous ces instruments à clavier qui ont eu un grand succès auprès des jeunes et dont j'ai été le premier à me servir. Mais tout cela venait de Bali." (Boivin, 1995, p. 339).

[41] In his reasoning on this type of connection, he also said that gamelan musicians identified more with his music because of his timbre characteristics and choice of instruments. As he himself tells in an interview with Samuel (1986, p. 111): "Mon élève, Gerald Levinson, qui a vécu à Bali pour apprendre la technique du gamelan, a fait, un jour, entendre à son maître balinais deux musiques européennes : un extrait de la *Symphonie en sol mineur* de Mozart, et un fragment de ma *Transfiguration*. Or c'est dans ma musique que le musicien balinais est entré le plus facilement, sans doute parce qu'il reconnaissait la sonorité des tam-tams et des gongs qui le renvoyait à ses métallophones. La musique de Mozart le laissait indifférent."

[42] "C'est probablement grâce aux cours de Messiaen que Xenakis se fait une culture musicale : les spécialistes de Messiaen seraient sans doute intéressés par les notes parfois consistantes que Xenakis prend à l'occasion de ces cours, notes que l'on trouve dans les Archives Xenakis." (Solomos, 2008, p. 3).

was habitual in Xenakis' daily life from at least the 1950s. This search for the music of the "others" became part of his understanding of music and described his concepts and points of view with a more universalizing approach. In this sense, decades after his training, he started participating in events that mainly discussed the dichotomy of East-West, presenting fundamental papers of his compositional thinking. Two events about Asian and European traditions and avant-garde approaches seem seminal because the composer actively participated, and, more importantly, these events had Indonesian music (addressed in academic works and artistic performances) as part of their main activities.

### 1.1.3 East-West Music Encounter (Tokyo, 1961)

This event was conceived and organized by the composer Nicholas Nabokov in 1955 and occurred in 1961, sponsored by the Congress for Cultural Freedom (CCF)[43]. It was a massive festival (Fig. 1.3) in terms of structure, management, and operation that occurred in Japan, projecting the country as a reference in the organization of large international events. For the time, the achievements were unique, and the proposal innovative, changing not only the view about post-war Japan as a whole[44] but also the discussions about the artistic relations between East and West. In terms of conceptual foundations, this was an important festival for discussing and articulating ideas and establishing some experiences for later academic or artistic events in the genre (even if the specific approach deserved the critics it received). Its dimension also had epic proportions in terms of the length (twenty days total, from April 17 to May 6) and the number of activities. Rostand (1961, p. 73) summarily stated that: "This Congress-Festival was not automatically devoted to contemporary music but to all musics–to the music of Stravinsky as well as to that of the Occidental Middle Ages, to that which has been played in the Imperial Court of Japan for over a thousand years as well as to that of India or of Indonesia. [underline added]".

[43] The political implications of this Cold War period will not be addressed here, for more details consult Yang (2017) and Fukunaka (2017).
[44] As Fukunaka (2017, pp. 61-62) stated "the Tokyo East-West Music Encounter Festival in 1961, was a feat of an unprecedented scale that symbolized Japan's rise to the status of international music capital."

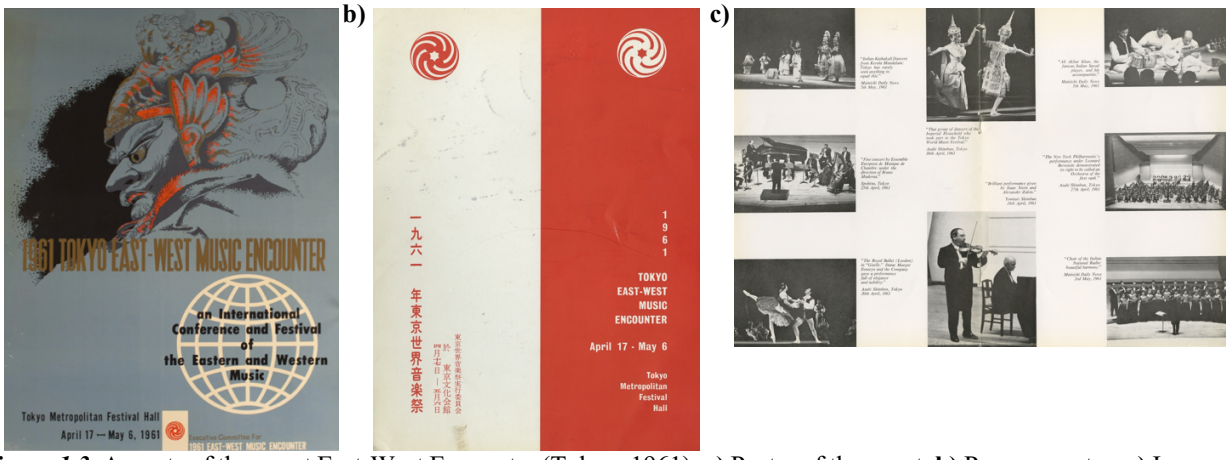



***Figure 1.3***. Aspects of the event East-West Encounter (Tokyo, 1961). **a)** Poster of the event. **b)** Program notes. **c)** Images inside the program notes indicating part of the artistic events scheduled. Source: © Famille I Xenakis DR.

In a memo to the headquarters of the CCF about the event's purpose, Nabokov stated:

> Though exchanges between Asia and the West in the field of music have (hitherto) been scarce (and haphazard), this is clearly not the result of inadequate communication or lack of good will. The reason lies rather (in the nature of music itself or, more accurately,) in the widely differing ways by which both Easterners and Westerners approach their own and each other's music. (...) It is because of these considerations that a dialogue between East and West on the art of music is necessary. (Nabokov *appud.* Fukunaka, 2017, p. 67).

This could synthesize the event's aims from the perspective of its conceiver; however, a biased understanding of the relation East-West was evident in this argument. Nabokov was also not considering more profound aspects of why these "scare exchanges" occurred (such as ethnocentric postures, Western commercial interests, and strategies of expansion and domination, to mention a few). This is why, among other criticisms regarding the relations established during the event, Yang (2017), who addressed East and West post-war avant-gardism in music and its connection with Cold War cultural politics, also pointed out that "different musical cultures were represented [in the event] following a polarized model of modernism vs. traditionalism."[45] (Yang, 2017, p. 44). Fukunaka (2017) points to the same critiques, adding that "the 1961 East-West Music Encounter confirmed a traditional, bipartite picture of music: Western music placed against Japanese and other non-Western traditional musics whose aesthetics and practices were entirely unconnected to then-popular notions of contemporary, westernized society." (Fukunaka, 2017, p. 66).

The composers mentioned as some of the active participants include Leonard Bernstein, Luciano Berio, Elliott Carter, Henry Cowell, Lou Harrison, Toshirō Mayuzumi, Alan Hovhaness, Bruno Maderna, Moroi Makoto, Virgil Thomson, Boris Blacher, and Iannis Xenakis[46]. The

[45] This is mentioned because clear differences will be established in comparison with the next event discussed, the International Music Symposium called Musics of Asia (Manila, 1966).

[46] As stated by Rostand (1961, p. 73): "Around a hundred composers, musicologists and music critics of thirty Occidental and Asiatic countries, without counting the soloists and orchestras coming from just about everywhere to illustrate the themes under discussion, participated in the music conference-festival organized in Tokyo by Nicolas Nabokov."

interpreters Aloys and Alfons Kontarsky, Seiji Ozawa, Isaac Stern, Hermann Prey, and the ensembles and companies (such as The Juilliard String Quartet, The New York Philharmonic, and The Royal Ballet) are a few examples of the artistic performances. Fukunaka (2017, p. 66) stated about the Eastern performative arts: “musicians and dancers of Indonesian, Indian, and Japanese traditional genres took part. The audience thus enjoyed the indigenous musics of India, Indonesia, and Japan, as well as European classical and avant-garde repertoires.” The use of the terms “bipartite picture of music” in a previous mention by Fukunaka seems appropriate when confronted to this last description by the same author.

Musicologists Colin McPhee, Mantle Hood, José Maceda (also composer), Trần Văn Khê, Alain Danielou, Roberto Garfias, Hans Heinz Stuckenschmidt and others also participated in the activities. Their contributions were a part of the encounter because, in addition to concerts, the festival presented academic conferences that were considered a fundamental part of the event (Fig. 1.4).

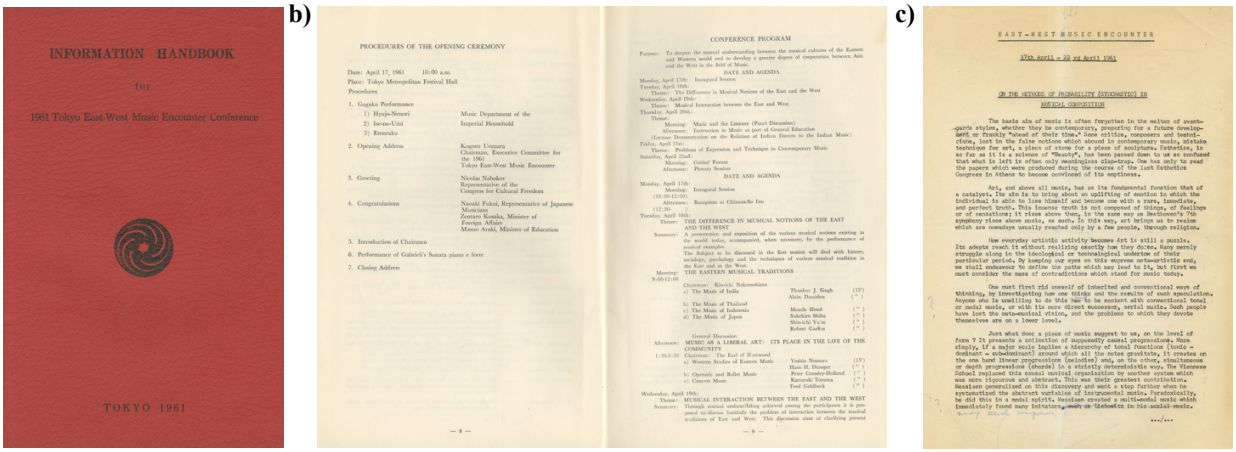



***Figure 1.4***. Elements of the conferences cycle during the East-West Encounter (Tokyo, 1961). **a)** Coverture of the annals. **b)** Schedule of the activities tied to the musicological and ethnomusicological event. **c)** First page of Xenakis’ text “Stochastic Music”. Source: © Famille I Xenakis DR.

About this part of the event, Fukunaka (2017, p. 66) stated that one of the sessions, titled “Music: East and West,” had different “highly generic titles” panels such as “Western Music in India,” “Western Music in Japan,” or “The Music of Indonesia,” mainly being “no more than informative and fact-oriented in character” (Fukunaka, 2017, p. 66). Yang (2017, p. 45) synthesized this part of the event, mentioning that:

> Judged from the reports of conference participants, the East/West and tradition/modern divisions are indeed clear-cut in presentations of traditional music of India, Japan, Indonesia, China on the one hand, and, on the other, of composers from Europe and the U.S. addressing the modern conceptions of music by Elliott Carter, Iannis Xenakis, and Virgil Thomson. The history of Euro-American musical practices in Asia was discussed in several talks on the modernization of music in Japan. There were exceptions; the lecture on electronic music was given by the Japanese composer Moroi Makoto; and there were composers proposing mutual influences of East and West, for instance Henry Cowell and Lou Harrison, as well as the Filipino composer/ethnomusicologist José Maceda who challenged the arbitrary divisions

On the specific topic of Indonesian traditions, McPhee's (1961) text "Problems of Indonesian Musical Tradition Today: The Music Crisis in Bali Today" was essentially a complaint and a critique about the modernization of Balinese gamelan. According to him, the external influence could extinguish some specific practices and erode the cultural richness of the island; being his article much more of a constant critique of any contact between Indonesia and the Occident. Hood (1961) published the article "The music of Indonesia," focusing on Java and Bali and summarily discussing the historical aspects of the Hindu influence and the constitution of the gamelan traditions. He presented some initial aspects about the differences between the music of Bali and Java, and as the notes indicate, he presented some recorded examples during his lecture. Discussing a broader context, Henry Cowell (1961) sent the text "Oriental influence on the Western Music," giving a historical overview of the exchanges that also determined many characteristic periods of music history. He not mentioned only the Indonesian relevance on the subject but also Middle-East and Indian traditions that many other composers would have tried to understand and become familiarized with, such as Wolfgang A. Mozart, Claude A. Debussy, Béla Bartók, John Cage, and Lou Harrison. In a very incisive conclusion, he stated, "Oriental music should now replace Schoenberg and Stravinsky in this way."

Xenakis sent to the event the text "Stochastic music" (Xenakis, 1961c), in which he addressed the main points of applying mathematical stochastic approaches in composition. It is related to previous articles such as "La crise de la musique sérielle" (Xenakis, 1955), "Auf der Suche einer Stochastischen Musik" (Xenakis, 1958) and "Grundlagen einer stochastischen Musik Elements of Stochastic Music" (a series of four articles published during 1960 and 1961–Xenakis, 1960a; 1960b; 1961a; 1961b) and later published with modification as "Stochastische Musik" (Xenakis, 1962) and as part of his book *Musiques formelles* (Xenakis, 1963). Even if there is no mention of traditional music (as would be the case in "Structures Outside of Time," presented in 1966 and better explained in the next section), the text is situated in one of the important lines of discussion of his compositional thinking. Even though he would not address the questions about non-Western music in this particular lecture, it still seems that the approach of gathering East and West musics during the Encounter as a whole (be it in the performative part or the musicological and ethnomusicological part) has inspired him in this perspective. This might be why Xenakis would address some personal perspectives about the subject in his future texts from this moment. The event may have been politically biased regarding the Cold War scenario, but it certainly seeded an even greater interest in Eastern cultures in Xenakis. The East-West Encounter was a dense panorama of specialists and artists involved in exchanges about the most varied types of traditional music (including Indonesian music), with a discussion session

and performance activities primarily dedicated to traditional and avant-garde music, and this take of Xenakis' perspectives. As Turner (2014, p. 47) stated:

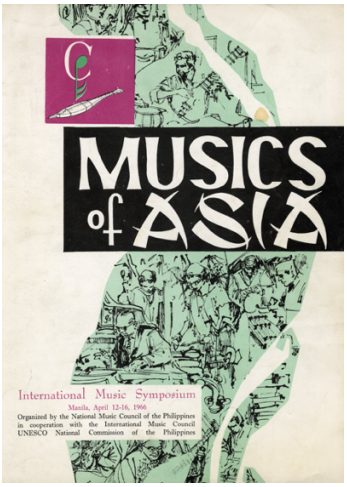
> Xenakis' participation in the 1961 Tokyo East-West Music Encounter and his resultant trip to Japan had a broad effect on his musical thinking, but particularly with respect to his ideas about theater and cultural continuity. His wife Françoise recalled in 2004: "When he first went there, he said, 'I am a Japanese man.' He was very enthusiastic about it, and he went to see Japanese theatre, all kinds, Kabuki and Noh."

Their interest in Japanese culture seemed very strong in him at that moment, but the event was also a critical ex situ connection with these traditions from Southeastern Asia in terms of his contacts with Indonesian culture. If, until then, Xenakis had only heard Indonesian music through recordings, this was possibly the first time that he experienced a live performance of a gamelan ensemble. It is also certain that, in terms of reflection on concepts that established connections between traditional and avant-garde music, this event was an important catalyst for much of Xenakis' later compositional thinking and many of his future arguments and approaches.

### 1.1.4 Musics of Asia—International Music Symposium (Manila, 1966)

The 1966 International Music Symposium (Fig. 1.5) could also indicate, as the festival previously addressed, how the subject of Asian traditional music represented an important matter for Xenakis in a variety of ways, be it due to his artistic and intellectual interests in these traditions or as an influence of these elements on his conceptions. It is thus clear, as it was in the case of the previous event, that the composer had access to performances from different Asian countries (including, again, gamelan music), as well as to researchers and specialists from many different musical traditions (this time particularly from China, India, Indonesia, Japan, Korea, the Philippines, Ceylon, Thailand, and Vietnam). The event allowed him to present and discuss fundamental elements of his theoretical work but also confronted him with the highly variegated context of Asian music.

**a)**

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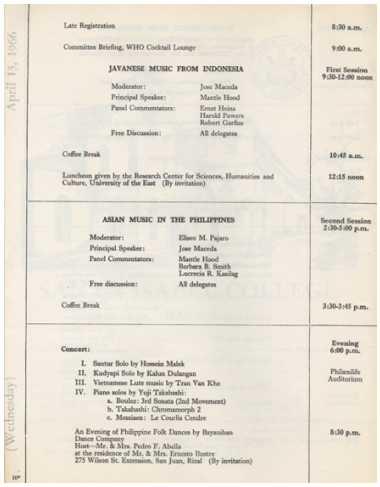


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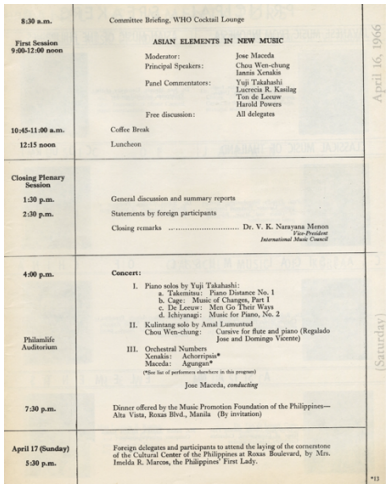


***Figure 1.5***. Program notes from Musics of Asia–International Music Symposium (Manila, 1966). Source: © Famille I Xenakis DR.

The International Music Symposium took place in Manila (Philippines) from April 12 to 16, 1966, with the title "Musics of Asia". The National Music Council of the Philippines organized the event in cooperation with the Philippine National Commission for UNESCO and the International Music Council. It had Antonio Buenaventura as the president and José Maceda as one of the vice presidents. As Maceda (1966, p. 7) stated about the event:

> Unlike other conferences in Asia which discuss Eastern and Western music in confrontation with each other[47], this Symposium will focus on discussion, according to the limited means and time at its disposal, on the musics of Asia—more particularly, of East and South Asia. [...]
> The Symposium will not be restricted to talks about music. The evening concerts will provide live music played by renowned artists. To present a broader spectrum of sound, the program arrangements do not feature a traditional solo recital or the music of one particular culture exclusively. Rather, they introduce a mixed sequence of performers from different cultures in which musical numbers are carefully weighed in a balanced repertoire. The novel experience of hearing these musics in such a combination is a special feature of this Symposium.
> The Symposium does not intend to be a wholly musicological affair. Besides an objective examination of music, it tries to introduce new ideas of experimentation and change which underlie the spirit of musical creativity in Europe.

In this event, many specialists in Asian music participated in different sessions organized by country: "Javanese Music from Indonesia," "Asian Music in the Philippines," "Classical Music from India," "Classical Music of Vietnam," "Classical Music of Thailand," "Court Music of Japan," "Classical Music of China," and "Classical Music of Korea," in addition to a session that was in connection with avant-garde tendencies called "Asian Elements in New Music" (in which Xenakis participated by presenting his paper). This last one seems to point to something innovative and new in terms of its proposition, which was the main component of this particular symposium. As Maceda (1966, p. 7) stated about it:

> Avant-garde music has been interested in the exploration of sound phenomena—in tonal qualities that cannot be expressed in scales, or by the traditional use of instruments, or by the usual associations of sound and emotion. Perhaps, this quest may find satisfaction, in part, in some Asian musics—in which a different value is attributed to the structure of scales, where many instruments do not have a focused pitch, and where sounds are connected with the emotions in a very different way. The application of these new things to musical creativity can and should be pursued further, but perhaps, no truly significant change can take place unless the different cultures fully understand or are entirely integrated with each other.
> In the meanwhile, speculations that may arise from a scientific evaluation of traditional Asian music, as well as artistic experimentation of new material from the East and West, could incite other ideas for a musical change in Asia [underline added].

The session, with Mantle Hood as the principal speaker, Ernst Heins, Harold Powers, and Robert Garfias as panel commentators, and José Maceda as moderator, specifically discussed

[47] This statement seems to refer to the 1961 East-West Music Encounter, reiterating some criticisms of the main aspects of this event. The second and third paragraphs of this excerpt also seem to confront the approach criticized as a "polarized model of modernism vs. traditionalism" by Yang (2017, p. 44), and a dichotomic encounter between European avant-garde and Asian traditions. The objectives in the Musics of Asia were more integrative and assumed a balance between avant-garde and traditional music.

Javanese music (Fig. 1.5b). A brief report about the event is available (Veneración, 1967), providing a window into the main topics, statements, and discussions. Concerning the Javanese session Music from Indonesia, verification that Hood's presentation was based "on nine levels of reference for group improvisation in the Javanese Gamelan. These are: 1) two tuning systems (*slendro* and *pelog*); 2) three principal modes; 3) traditional musical forms; 4) '*balungan*'; 5) nuclear theme; 6) instrumental and vocal idiom; 7) local style; 8) group empathy; and 9) personal style" (Veneración, 1967, p. 107). Hood then presented recordings of both tuning systems (*slendro* and *pelog*) to illustrate his speech.

In contrast, Heins discussed musical elements in Javanese culture concerning society's social and religious aspects. Powers compared Javanese music to Indian music, and Garfias compared it to Japanese and Korean music. In the same report, verifying that Xenakis interacted during the session is possible. As commented by Veneración (1967, p. 108), "During the free discussion, Mr. Iannis Xenakis, composer, felt that there seemed to be a confusion in music which may be resolved by seeking for a universal structure which in turn can be separated into a time structure and a temporal structure [underline added]."

Xenakis also interacted in the session "Classical Music of India." This session had David Morton as a moderator and Harold Powers as the principal speaker, presenting "A Comparative Approach to the Classification of Ragas"; V. K. Narayana Menon, Ton de Leeuw, and Ernst Heins served as panel commentators. Powers criticized the classification of ragas based primarily on scale types, comparing the South and the North Indian Todi and Western and Indian terminologies for the vina tuning. As Veneración (1967, p. 109) reported, "The discussion ended with a spirited debate between Mr. Xenakis and Dr. Powers regarding the scale system, the analysis of pitch and rhythm, the relationship between the pitches, and the totality of harmonic combinations."

The participation of Xenakis in both sessions highlights his interest in specific themes that would come to be part of his approach over time. Xenakis' eagerness to seek a universalist understanding that would potentially aggregate all types of music was already present and clear[48]. As emphasized in his interactions during the symposium, their interests in universal systems would become something that structured his work very differently from the 1970s onward. For this purpose, he would, among many other things, create his way of developing pitch collections using mathematical tools derived from Sieve Theory. Some of these, as discussed later, gathered intervallic

[48] It is also important to point out that he undertook this search for "a universal structure" by studying the music of different cultures. It was something recurrent in his statements, as he mentioned for example on various occasions to Bálint András Varga, "I studied Indian percussion music a long time ago—not to imitate it, but to understand the underlying principle, these shifts of rhythm which produce a multilayered system even on a single instrument" (Varga, 1996, p. 147). He also mentioned: "I was intrigued to observe players in Senegal. I recorded them on my portable machine and studied their technique on my return home" (Varga, 1996, p. 149).

and harmonic spaces of typical Eastern scales due to this confluence of ideas and exchanges over time (for more details, see Chapter 7).

During the event, Xenakis presented his paper in the session titled "Asian Elements in New Music" (Fig. 1.5c). It had José Maceda as the moderator, Xenakis, Chou Wen-Chung as the principal speakers, Yuji Takahashi, Lucrecia R. Kasilag, Ton de Leeuw, and Harold Powers as commentators[49]. Wen-Chung discussed Western avant-garde composers' interest in Eastern musical heritage. He pointed out, "There is a serious interest in compositional concepts and techniques influenced by Eastern philosophies that could be developed into a much more sophisticated view of serial music" (Veneración, 1967, p. 112). The session continued as follows:

> Miss Kasilag then enjoined creative composers to adapt and make use of prevailing indigenous folk music as nuclear themes in future compositions. On the other hand, Dr. Powers felt that pure and individual developments in relation to one's own culture should be supported and nurtured rather than merging Western and Asian ideas. Dr. Pajaro asked for new scales developed by some contemporary composers, to which Dr. Chou Wen-chung replied that he did not believe in arbitrary scales, as there is no need for a new one. Dr. Maceda added that Asian and Western musical devices cannot very easily be integrated [underline added] (Veneración, 1967, p. 112).

The last session speaker was Ton de Leeuw (Xenakis preceded him, but this will be addressed soon with more details), who discussed differences and similarities in the kinds of music of the East and West and the processes of influence, assimilation, and acculturation. He questioned: "Are we striving for one music as a universal language, or are we maintaining and strengthening the existing, autonomous musical cultures, fighting off any outside influence?" (Veneración, 1967, p. 113). He then pointed out that music educators have an important role in preparing students for events tied to industrial and technical progress and acculturation processes.

The paper presented by Xenakis was titled "Structures hors-temps" (Xenakis, 1971)[50]. Veneración (1967, pp. 112-113) stated that:

> In the afternoon session, Mr. Iannis Xenakis pointed out abstract and logical constructions in Byzantine and Greek music. He also explained mathematically, structures in "time" and "space," which he classified as transversal and comparative musicology, respectively. He believes that through such structures, musicians specializing in the fields of music of different nationalities would be able to exchange musical concepts intelligibly and intelligently.

[49] On the same day as this session, a concert that presented solo, chamber, and orchestral music took place. Among the last pieces, *Achorripsis* (1956–1957) was conducted by José Maceda. As one of the vice-presidents, Maceda stated that "Asian music also is bound to change [...] How is this change in Asian music to take place? This is of course difficult to foretell—and to control. However, by dealing with avant-garde music in the discussions as well as by preparing concerts in which Asian and avant-garde musics are played in sequence, the Symposium may suggest ideas or directions towards such a change". In a publication about Xenakis many years after the event, he expressed, "I proposed, on this occasion, three types of music in one concert: traditional Filipino music, Xenakis', and my own. I believe that this presentation–confrontation was new and interesting for the audience". Original text: "J'ai proposé, à cette occasion, trois types de musique dans un concert : musique traditionnelle philippine, de Xenakis, et de moi-même. Je crois que cette présentation-confrontation était nouvelle et intéressante pour l'auditoire" (Maceda, 1981, p. 336).

[50] The text was published in French in the annals of the event as "Structures hors-temps", but it seems that he orally presented it in English as "Structures Outside of Time".

The text was one of multiple produced in the 1960s that constituted a significant step in his intellectual and theoretical approach. According to Solomos (2008a), the paper was based on an unpublished text from December 1965 entitled "Harmoniques (structures hors-temps)" that made references to Messiaen, however "Structures hors-temps" was presented without many of the references to his teacher. After that, the text evolved and was published in several versions. With a new introduction and conclusion, it turned into a text called "Vers une métamusique," and, outside its publication as an article (Xenakis, 1967), was included in parts of his two main books: "Musique. Architecture" (Xenakis, 1976) and the revised edition of "Formalized music" (Xenakis, 1992a).

Xenakis (1971, p. 152) stated in the first paragraph of "Structures hors-temps":

> This Symposium [Musics of Asia] is, for me, an unexpected opportunity to raise fundamental questions about music and perhaps get answers from the wisdom of high Asian cultures. These answers may build bridges. They will perhaps allow the discovery and osmosis of universal concepts and rules of music in time and space and establish a dialogue and exchange in depth because, until now, the borrowings are superficial, being based on the exoticism, the easy and inauthentic displacement. The questions I would like to ask have to do first with the primary structures and then with the architectures of higher rank. In Europe itself, these questions are rarely asked in a consistent and general way embracing the past, the present, and the future. But a discussion in this sense may finally lead to a common musical language, with East and West serving as mirrors for each other. Besides, European music is a daughter of the ancient Greek music, whose relations or even probably some strains have their roots in Asia.[51]

This paragraph says a lot about the manifest differences with the presentation of "Stochastic music" (Xenakis, 1961c) during the East-West Music Encounter. For the East-West Music Encounter, Xenakis discussed the foundations of stochastic music exclusively, while for the Musics of Asia Symposium, extra-European music was part of the examples of his concepts applied. These examples were an important part that confirmed his interest in the mathematical tools he was currently using and reinforced the universalist aspects of his arguments. In the first text, he addressed the particulars of a specific type of approach. The second text contained a broad discussion including non-Western music.

The text "Structures hors-temps" initially points to the definition of categories "outside-time" and "inside-time" (two fundamental concepts for his intellectual approach, as part of a bipartite theory of the composer[52]). During the discussion, Xenakis used several examples referring to Byzantine and

[51] "Ce Symposium est pour moi inespéré car je pourrai poser des questions fondamentales qui concernent la musique et peut-être obtenir des réponses venant de la sagesse des hautes cultures asiatiques. Ces réponses pourront établir des ponts. Elles permettront peut-être la découverte et l'osmose de concepts et de règles universels de la musique dans le temps et l'espace et établir un dialogue et échange en profondeur car jusqu'ici les emprunts sont superficiels, étant basés sur l'exotisme, le dépaysement facile et inauthentique. Les questions que je voudrais poser ont traits aux structures premières d'abord puis, aux architectures de rang plus élevé. En Europe même, ces questions sont rarement posées d'une manière conséquente et générale embrassant le passé, le présent et l'avenir. Mais une discussion dans ce sens risque de dégager enfin un langage musical commun, l'Est et L'Ouest se servant mutuellement de miroirs. D'ailleurs la musique Européenne est une fille de la musique antique grecque dont les relations ou même probablement certaines souches ont leurs racines en Asie." (Xenakis, 1971, p. 152).

[52] This was initially described as a tripartite theory (with outside-time, temporal and inside-time categories), but he ended

Gregorian music and the Pythagorean and Aristotelian approaches compared to his bipartite categories. Specifically, on the subject of non-European music, he stated:

> We will now expose the structure of Byzantine music. It can be used to understand infinitely better: ancient music, western plainchant, traditional non-European music, the dialectic of recent European music and its wrong turns and dead ends; to foresee and build the future with a view overlooking the distant landscapes of the past and the electronic future.[53] (Xenakis, 1971, p. 156).

In order to have a mathematical tool applied to many kinds of music, he described the Sieve theory. For him, applying the principles of this theory could thus explain and group constituent elements of very diverse things because of common axiomatic principles. It is thus after the enunciation of five axioms that Xenakis (1971, p. 166) affirms:

> We have just axiomatically defined not only a tempered chromatic scale of the pitches but also of all the properties or sound characteristics of the domain D[54] stated above (density, intensity, ...). Moreover, this abstract scale [...] does not have a unitary displacement defined or related to an absolute quantity. Thus, it can be constructed either with tempered semitones, or with Aristoxenian segments (twelfths of the tone), or with commas of Didymos (81/80), or with quarter tones, or with tones, thirds, fourths, fifths, octaves, etc... or with any other unit of which no multiple corresponds to the perfect octave.[55]

So, after a definition of specific terms (congruence, residual class, sieve, disjunction, conjunction, and negation essentially), he would end up presenting the sieves applied to the formation of major, Byzantine, pentatonic and heptatonic Indian scales, demonstrating that any musical

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up considering only two categories: the "hors-temps" (outside-time) and the "en-temps" (inside-time). While outside-time category defines what is present in the musical elements of the architecture and potential basic structures (as Xenakis exemplified, a scale), the inside-time defines what is of its application in time and in its manifestation (e.g., a melody or chords that are a consequence of the scale structure when being used in practice). "Ce qui se laisse penser sans changer par l'avant ou l'après est hors-temps. Les modes traditionels sont partiellement hors-temps, les relations ou les opérations logiques infligées à des classes de sons, d'intervalles, de carcatères... sont aussi hors-temps. Dès que le discours contient l'avant ou l'après, on est en-temps. L'ordre sériel est en-temps, une mélodie traditionnelle aussi. Toute musique, dans sa nature hors-temps, peut être livrée instantanément, plaquée. Sa nature en-temps est la relation de sa nature hors-temps avec le temps. En tant que réalité sonore, il n'y a pas de musique hors-temps pure ; il existe de la musique en-temps pure, c'est le rythme à l'état pur." (Xenakis, 1994, p. 68). "His thesis was that both musical composition and perception take place mainly outside of time. We can locate the main originality of Xenakis's thinking in this kind of *exteriority* of the temporal experience: music takes place in the instantaneous present, but our experience takes place at the exterior of this 'present' [...]" (Exarchos, 2015, p. 212). For more details on these essential concepts of the Xenakian theory, see also the composer's texts *Kéleütha* (Xenakis, 1994).

[53] "Nous allons maintenant exposer la structure de la musique byzantine. Elle peut servir pour comprendre infiniment mieux : la musique antique, le plain-chant occidental, les musiques traditionnelles non-Européennes, la dialectique de la musique européenne récente et ses fausses-routes et impasses ; pour prévoir et bâtir l'avenir avec une vue dominant les paysages lointains du passé et du futur électronique." (Xenakis, 1971, p. 156).

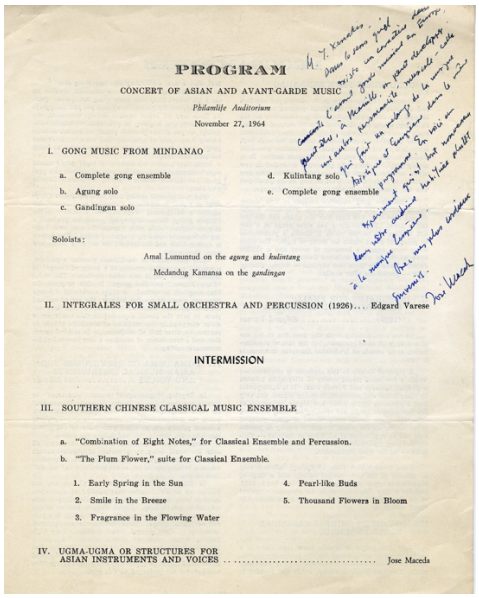
[54] Defining some terms and elements that constitute the basis of the five axioms, Xenakis stated: "D [is] the set of values of the sound characteristic under consideration (pitch, density, intensity, duration, speed, order...)." Original text: "*D* l'ensemble des valeurs de la caractéristique sonore envisagée (hauteur, densité, intensité, durée, vitesse, ordre...)." (Xenakis, 1971, p. 166).

[55] "Nous venons de définir axiomatiquement non seulement une échelle chromatique tempérée des haut[e]urs mais aussi de toutes les propriétés ou caractéristiques sonores du domaine *D* énoncées plus haut (densité, intensité, ...). De plus cette échelle abstraite [...] n'a pas de déplacement unitaire défini ou rapporté à une grandeur absolue. C'est ainsi qu'elle peut être construite soit avec des demi-tons tempérés, soit avec des segments aristoxéniens (douzièmes du ton), soit avec des commas de Didymos (81/80), soit avec des quarts de ton, soit avec des tons, des tierces, des quartes, des quintes, des octaves, etc... ou encore avec toute autre unité dont aucun multiple ne corresponde à l'octave juste." (Xenakis, 1971, p. 166).

structure could be ordered and produced by this tool. He also pointed out that general structural models originated or characteristic of one parameter could be applied to the composition of other ones (such as intensity, e.g.) or intercorrelated with other artistic domains (he mentioned visual arts essentially)[56]. In his conclusions, he stated that: "this method is capable of unifying the expression of the fundamental structures of all Asian, African, European music, etc... It has a considerable advantage: its mechanization, and consequently the tests and models of all kinds that it will be able to introduce into computers that will greatly advance the musical sciences."[57] (Xenakis, 1971, pp. 171-172).

The presence of many different aspects—not only rational processes during the conference exchanges but also artistic ones due to the concert's central role in the schedule certainly motivated Xenakis during the symposium. Another factor to mention was the personal exchange with other participants, as it is perceptible in the documents consulted in the *Collection Famille Iannis Xenakis*. Xenakis was also inspired to consider some perspectives on avant-garde and Asian traditions by Maceda[58] in a specific exchange during the event. Maceda gave him a program note from a past concert called "Asian and avant-garde music" on November 27, 1964 (Fig. 1.6).

**a)**



PROGRAM

CONCERT OF ASIAN AND AVANT-GARDE MUSIC

*Philamlife Auditorium*

November 27, 1964

I. GONG MUSIC FROM MINDANAO

a. Complete gong ensemble
b. Agung solo
c. Gandingan solo
d. Kulintang solo
e. Complete gong ensemble

Soloists:

Amal Lumuntod on the *agung* and *kulintang*
Medandug Kamansa on the *gandingan*

II. INTEGRALES FOR SMALL ORCHESTRA AND PERCUSSION (1926)... Edgard Varese

INTERMISSION

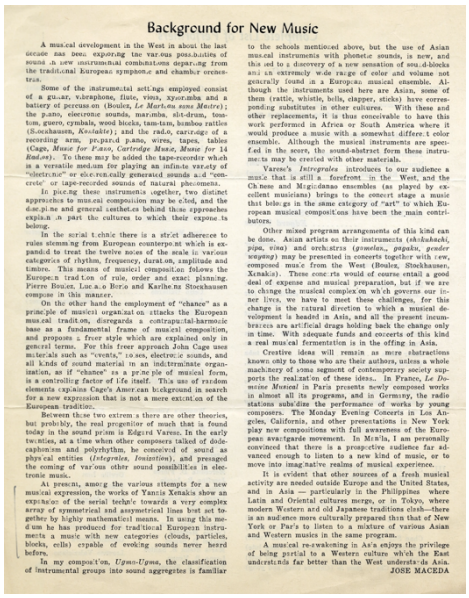
III. SOUTHERN CHINESE CLASSICAL MUSIC ENSEMBLE

a. "Combination of Eight Notes," for Classical Ensemble and Percussion.
b. "The Plum Flower," suite for Classical Ensemble.

1. Early Spring in the Sun
2. Smile in the Breeze
3. Fragrance in the Flowing Water
4. Pearl-like Buds
5. Thousand Flowers in Bloom

IV. UGMA-UGMA OR STRUCTURES FOR ASIAN INSTRUMENTS AND VOICES ..... Jose Maceda

**b)**



Background for New Music

A musical development in the West in about the last decade has been exposing the various possibilities of sound in new instrumental combinations departing from the traditional European symphonic and chamber orchestra.

Some of the instrumental settings employed consist of a guitar, vibraphone, flute, vina, xylorimba and a battery of percussion (Boulez, *Le Marteau sans Maitre*); the piano, electronic sounds, marimba, slit-drum, tom-tom, guero, cymbals, wood blocks, tam-tam, bamboo rattles (Stockhausen, *Kontakte*); and the radio, carriage of a recording arm, prepared piano, wires, tapes, tables (Cage, *Music for Piano, Cartridge Music, Music for 14 Radios*). To these may be added the tape-recorder which is a versatile medium for playing an infinite variety of "electronic" or electronically generated sounds and "concrete" or tape-recorded sounds of natural phenomena.

In piecing these instruments together, two distinct approaches to musical composition may be cited, and the discipline and general aesthetics behind these approaches explain in part the cultures to which their exponents belong.

In the serial technic there is a strict adherence to rules stemming from European counterpoint which is expanded to treat the twelve notes of the scale in various categories of rhythm, frequency, duration, amplitude and timbre. This means of musical composition follows the European tradition of rule, order and exact planning. Pierre Boulez, Luciano Berio and Karlheinz Stockhausen compose in this manner.

On the other hand the employment of "chance" as a principle of musical organization attacks the European musical tradition, disregards a contrapuntal-harmonic base as a fundamental frame of musical composition, and proposes a freer style which are explained only in general terms. For this freer approach John Cage uses materials such as "events," noises, electronic sounds, and all kinds of sound material in an indeterminate organization, as if "chance" as a principle of musical form, is a controlling factor of life itself. This use of random elements explains Cage's American background in search for a new expression that is not a mere extention of the European tradition.

Between these two extremes there are other theories, but probably, the real progenitor of much that is found today in the sound prisms is Edgard Varese. In the early twenties, at a time when other composers talked of dodecaphonism and polyrhythm, he conceived of sound as physical entities (*Integrales, Ionization*), and presaged the coming of various other sound possibilities in electronic music.

At present, among the various attempts for a new musical expression, the works of Yannis Xenakis show an expansion of the serial technic towards a very complex array of symmetrical and assymetrical lines bent act together by highly mathematical means. In using this medium he has produced for traditional European instruments a music with new categories (clouds, particles, blocks, cells) capable of evoking sounds never heard before.

In my composition, *Ugma-Ugma*, the classification of instrumental groups into sound aggregates is familiar to the schools mentioned above, but the use of Asian musical instruments with phonetic sounds, is new, and this led to a discovery of a new sensation of sound-blocks and an extremely wide range of color and volume not generally found in a European musical ensemble. Although the instruments used here are Asian, some of them (rattle, whistle, bells, clapper, sticks) have corresponding substitutes in other cultures. With these and other replacements, it is thus conceivable to have this work performed in Africa or South America where it would produce a music with a somewhat different color ensemble. Although the musical instruments are specified in the score, the sound-abstract form these instruments may be created with other materials.

Varese's *Integrales* introduces to our audience a music that is still a forefront in the West, and the Chinese and Mindanao ensembles (as played by excellent musicians) brings to the concert stage a music that belongs in the same category of "art" to which European musical compositions have been the main contributors.

Other mixed program arrangements of this kind can be done. Asian artists on their instruments (*shakuhachi, pipa, vina*) and orchestras (*gamelan, gagaku, gender wayang*) may be presented in concerts together with new, composed music from the West (Boulez, Stockhausen, Xenakis). These concerts would of course entail a good deal of expense and musical preparation, but if we are to change the musical complexion which governs our inner lives, we have to meet these challenges, for this change is the natural direction to which a musical development is headed in Asia, and all the present incumbrances are artificial drugs holding back the change only in time. With adequate funds and concerts of this kind a real musical fermentation is in the offing in Asia.

Creative ideas will remain as mere abstractions known only to those who are their authors, unless a whole machinery of some segment of contemporary society supports the realization of these ideas. In France, *La Domaine Musical* in Paris presents newly composed works in almost all its programs, and in Germany, the radio stations subsidize the performance of works by young composers. The Monday Evening Concerts in Los Angeles, California, and other presentations in New York play new compositions with full awareness of the European avantgarde movement. In Manila, I am personally convinced that there is a prospective audience far advanced enough to listen to a new kind of music, or to move into imaginative realms of musical experience.

It is evident that other sources of a fresh musical activity are needed outside Europe and the United States, and in Asia — particularly in the Philippines where Latin and Oriental cultures merge, or in Tokyo, where modern Western and old Japanese traditions clash—there is an audience more culturally prepared than that of New York or Paris to listen to a mixture of various Asian and Western musics in the same program.

A musical re-awakening in Asia enjoys the privilege of being partial to a Western culture which the East understands far better than the West understands Asia.

JOSE MACEDA

***Figure 1.6***. Program notes of a 1964 concert organized by José Maceda that was given to Xenakis during the 1966 Music Symposium. Source: © Famille I Xenakis DR.

[56] "La Théorie des Cribles est absolument générale et par conséquant applicable a d'autres caractères des sons qui seraient munis de la structure d'ordre total, tels que l'intensité, les durées, les degrés d'ordre, etc... Je l'ai déjà dis ailleurs ainsi que dans l'axiomatique des cribles. Mais cette methode peut également s'appliquer aux échelles visuelles et aux domaines des arts optiques du futur. D'ailleur dans la perspective du futur immédiat, sera l'exploration de cette théorie et son utilisation partout à l'aide des ordinateurs car elle est méchanisable en entier." (Xenakis, 1971, p. 171).

[57] "cette méthode est capable d'unifier l'expression des structures fondamentales de toutes les musiques Asiatiques, Africaines, Européennes, etc... Elle a un avantage considérable : sa mécanisation, et par conséquant les tests et les modèles de toutes natures qu'elle pourra introduire dans les ordinateurs qui feront grandement avancer les sciences musicales." (Xenakis, 1971, pp. 171-172).

[58] Maceda and Xenakis met in person in Tokyo in 1961 during the East-West Music Encounters and corresponded for some time. For more details, see Maceda (1981).

This concert was organized according to a similar approach to the concerts that took place during the event (traditional music and avant-garde pieces side by side[59]). In a handwritten dedication, Maceda expressed:

> Mr. Y. Xenakis,
> In the sense that there is a character in the musical avant-garde in Europe, perhaps, in Manila, we can develop another musical personality–one that mixes Asian and European music in the same program. Here is an experiment that is new to our audience, which is used to European music. With my best regards.
> José Maceda[60]

In this program, Xenakis highlighted a passage that referred to himself. In the passage that grabbed the composer's attention, after mentioning Boulez, Stockhausen, Cage, Berio, and Varèse, Maceda expressed:

> At present, among the various attempts for a new musical expression, the works of Yannis Xenakis show an expansion of the serial technic towards a very complex array of symmetrical and asymmetrical lines best set together by highly mathematical means. In using this medium he has produced for traditional European instruments a music with new categories (clouds, particles, blocks, cells) capable of evoking sounds never heard before.

Maceda mentioned the composers in this program to situate his composition concerning the different avant-garde aesthetics in Europe. This way of treating traditional instruments and avant-garde music so closely might have inspired Xenakis. His attempts to find a way to develop a dialog among all kinds of music by using tools of universalization that could allow the kinds of music of different cultures "to exchange musical concepts intelligibly and intelligently" (as Xenakis mentioned during the event–Veneración, 1967, pp. 112-113) were vital elements in his mind at the moment.

Xenakis' universal point of view about Asian music, including ties with Greek and European traditions,[61] may have been, at the very least, reinforced and improved during the discussions at the Symposium. It also seems that particularly strong concerns about scales and the organization of pitches correlating non-European traditions became part of Xenakis' discussion in a much more substantial way, either in terms of reflection on and practical application of his compositional methods and tools.

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[59] The program presented traditional gong music from Mindanao (Philippines) and Southern China interspersed with avant-garde pieces by Varèse (*Integrales*—1926) and Maceda (*Ugma-Ugma or Structures for Asian musical instruments and voices*—1963).

[60] "M. Y. Xenakis, / Dans le sens qu'il existe un caractère dans l'avant garde musical en Europe, peut-être, à Manille, on peut développer une autre personnalité musicale–celle qui fait un mélange de la musique Asiatique et Européène dans le même programme. En voici un expériment qui est tout nouveau dans notre audience habituée plutôt à la musique Européène. Avec mes plus cordieux souvenirs. / José Maceda" (José Maceda, message to Iannis Xenakis, n.d., 1966).

[61] As something integrated and connected, these aspects were mentioned by Xenakis himself in many interviews and discussions about his music, and they were expressly included in his introduction of *Pléïades*, as pointed in the introduction of this chapter. Those elements will reappear in the present discussion on many occasions, and they seem fundamental to these understanding of how this Symposium in the Philippines in 1966, the trip to Indonesia in 1972-1973, and a new acoustical instrument created for a specific piece in 1978 could possibly be connected.

The text he presented points to two fundamental elements of his thinking: a bipartite theory that could systematize structures in their relation to time (outside-time and inside-time categories) and a mathematical tool (the Sieve theory) to produce new materials or explain previous ones (European or non-European). Xenakis systematically defines both as effective elements to prove that universals are reachable in all music traditions and avant-garde tendencies. At the event, Xenakis observed several Asian elements (Indonesian performative arts were just one of them).

### 1.1.5 Shiraz Arts Festival (Persepolis and Shiraz, 1969 and 1971)

The Shiraz Arts Festival was decisive in creating two pieces by Xenakis (*Persephassa* in 1969 and *Persepolis* in 1971). This festival took place between 1967 and 1977 and welcomed several avant-garde composers and many traditional music groups from all over the world. This event included music, dance, theater, film, and visual arts. It was thus in this multi-artistic atmosphere of cultural encounter between East and West, as well as of traditional artistic manifestations in parallel with new tendencies, that Xenakis was able to have contact with gamelan music once more (Fig. 1.7).

**a)**  **b)** 

***Figure 1.7***. Images of the gamelan presentation during the Shiraz Arts Festival (Iran) in 1969. Source: © AOTFD.

The 1969 Shiraz Arts Festival (Fig. 1.8a) was specially dedicated to percussion and brought together musicians from Brazil, France, India, Indonesia, Iran, Rwanda, and the USA. That year, Xenakis was present at the festival for the creation of *Persephassa* with Les Percussions de Strasbourg. Therefore, it is almost sure that he saw a presentation of the gamelan in the ancient ruins of Persepolis (Fig. 1.8b). This seems to be especially important because this Balinese group performed for the festival's official opening with a presentation of the Ramayana[62] (which, by

[62] We can be certain that the presentation was tied to the Ramayana because Afshar (2019, pp. 28-29) mentioned: "One particularly memorable Balinese program was the opening event in 1969, the story of Rama's struggle to rescue his wife Sita from the clutches of the demon Ravana. The highly stylized choreography, with the dancers' arms, fingers, and facial

coincidence, would again be experienced by the composer on his later trip to Indonesia). As stated by Charney (2020, p. 23):

> The third Festival in 1969 is often praised by scholars, critics, and artists for its theme and programming, which revolved around percussion music; it was dubbed "percussion around the world." Instead of featuring an orchestra, the opening event at Persepolis presented a concert of Gamelan Gong Kebyar and Balinese Traditional dance. The organizers attempted to rewrite elitist assumptions that percussion music was "primitive" or "uncivilized" by programming global traditional and contemporary percussion music on equal footing.

In this atmosphere of commitment to the percussion of traditional cultures, Xenakis stated, "We have a lot to learn from the percussion tradition of Asia, Africa, and the Far East in all areas. I am talking about percussion. There are three important families of percussion; African, the Hindu, and Far East. When I say Hindu, I mean the whole of the Near East. Furthermore, the European percussion is very basic, it must be said"[63] (Reichenbach, 1969).

**a)** **b)** **c)**


***Figure 1.8***. Shiraz Arts Festival presenting spectacles of gamelan music. **a)** Poster of 3rd Festival of Arts (Shiraz-Persepolis, 1969), designed by Ghobad Shiva. **b)** Photo of the gamelan presentation during the official opening of 3rd Festival of Arts. **c)** Poster of 5th Festival of Arts (Shiraz-Persepolis, 1971), designed by Ghobad Shiva. Source of all: © AOTFD.

The 1971 Shiraz Festival (Fig. 1.8c) also hosted a presentation of gamelan music and traditional dance with ballet dancers and gamelan musicians from Sunda (West Java). By coincidence, in the same year, Xenakis was present at the premiere of *Persepolis*, which, with *Diamorphoses* (1957), was part of the *Polytope de Persépolis* (he was thus responsible for the official opening this time). In both editions of the festival in which the composer participated, he had the opportunity to enjoy a gamelan presentation and it is quite certain that this occurred.

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expressions moving to the strange and hypnotic beat of the gamelan framed by lush colors and elaborate costumes conjured an unreal, timeless, and dreamlike dimension at Persepolis."

[63] "Nous avons beaucoup à apprendre de la tradition des percussions de l'Asie, d'Afrique, d'Extreme Orient dans tous les domaines. Je parle de la percussion. Il y a trois familles importantes de percussion, c'est l'africaine, l'hindoue et l'extreme-orientale. Quand je dis hindoue c'est tout le proche orient compris. Et la percussion européenne est très élémentaire, il faut bien le dire." (Reichenbach, 1969).

### 1.1.6 Potential interaction with Indonesian culture before the 1972-1973 trip

In the entire period before the 1972 trip to Indonesia, Xenakis certainly had much more contact with Indonesian music and gamelan ensembles than those previously discussed. To highlight some examples, the 1970 Osaka World Exposition and 1972 Festival d'Automne à Paris could be mentioned because, in both cases, the composer participated in parallel to a gamelan music performance. During the 1970 Osaka World Exposition (the first Japanese world fair, held from March 15 to September 13, 1970), he premiered *Hibiki-Hana-Ma* (1969-1970), an 18' long electronic piece developed for the Japanese Pavilion (in an installation of eight hundred loudspeakers and a laser beam device), and created *Amesha Spenta* (1969-1970), a kind of lumino-kinetic and sound sculpture developed by Xenakis for the Iran pavilion. During the same event, the Indonesian pavilion presented many artistic elements of the country. Sumarsam (2013, p. 6) specifically mentioned that:

> I was also one of the musicians in a performing group dispatched by the government to perform Javanese and Balinese gamelan at the 1970 Osaka World Exposition. Although music and dances from other islands were also performed, Javanese and Balinese gamelan and dance tended to be featured in the program. In the first place, the gamelan group demanded many resources, as two sets of gamelan had to be transported to Osaka, and the Javanese and Balinese musicians and dancers outnumbered the artists from other regions.

Another probable contact could have occurred during the 1972 Festival d'Automne à Paris (Xenakis was then creating *Polytope de Cluny*), when a traditional dance company from Bali performed all day from November 6 to 19 at the Champs Elysées Theater (Fig. 1.9). Maurice Fleuret, with whom Xenakis would travel to Indonesia one month later, organized this event.

**a)** **b)**

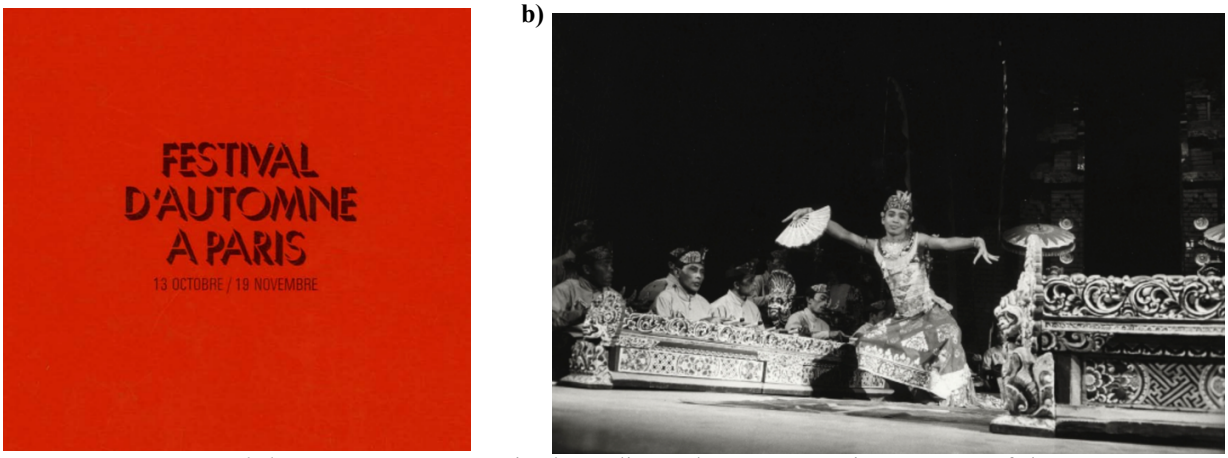


***Figure 1.9***. 1972 *Festival d'Automne à Paris* received a Balinese danse compagnie. **a)** Cover of the program notes. Source: BLGF. **b)** Gong Tjarman Wati de Sebatu during the performance at the festival. Source: www.festival-automne.com/edition-1972/ballets-bali – © Philippe GRAS.

He came into contact not only with musical groups and artists but also with specialists in Asian music. In a city as cosmopolitan as Paris, a significant number of concerts were available, and groups, artists, researchers, composers, and persons interested in the subject were certainly in Xenakis' circle

of friends and acquaintances (in addition to those he got to know on his numerous travels worldwide). As an example of this kind of contact, it is possible to mention Xenakis' friendship with the French composer François-Bernard Mâche, who traveled to Indonesia in 1972. He returned months before Xenakis' departure to the same country, and they discussed the local culture and music. As Mâche stated, this stimulated Xenakis' imagination:

> I had made a journey to Indonesia in 1972, and I brought back recordings that I published in the collection of the Musée de l'Homme Gamelan Balinais[64]. And I made Xenakis listen to them, and maybe they made him want to go there...[65] (Mâche, interview by author, 2020).

Such occasions roused Xenakis' interests, creating a whole sound imaginary and representing an intricate system of meanings, something yet reinforced by the strong composer's conceptions and theoretical point of view. Xenakis' interest in non-Western music and traditional percussion instruments was something for which he expressed great esteem and affection (he repeated several statements in this sense many times). He had *ex situ* contact with Indonesian music over decades (through recordings, concerts, readings, and exchanges with musicians and specialists), but his trip changed this by giving him direct access to diverse types of sonorities, instruments, and traditional performances *in situ*. Thus, for a short period, he traveled with a group of friends to Bali and Java in 1972-1973. However, as short as it was, that journey changed his music forever.

## 1.2 Xenakis' 1972-1973 journey through Indonesia: *in situ* experiences

Xenakis traveled through Indonesia with a group of musician friends: Betsy Jolas, Toru Takemitsu, Marie-Françoise Bucquet, Maurice Fleuret, and Henry-Louis de La Grange. This trip was also a family vacation because the travelers were each in the company of their respective spouses[66], forming a great group traveling together. As Jolas (interview by author, 2021) affirmed:

> Henry-Louis de La Grange and Maurice Fleuret had made this trip themselves, and they both decided... it was one of the trips Henry-Louis de La Grange offered Maurice Fleuret for his birthday. It was a surprise trip of sorts. They were both quite fascinated by Bali, and they decided to share it with their composer friends, but in a very musical way... That means that this trip was prepared very carefully, especially by Henry-Louis de La Grange; he had a correspondent in Bali who really marked out the ground before our arrival. So, we were literally expected in the villages where we were going, and these villages were celebrating to receive us! We were received like stars. It was extraordinary! We did not stop. Every day there was something... Then there were the things planned, for which we went by car, and there were also the unforeseen things, which struck us like that and which were often

[64] The disc called "Musiques anciennes de Bali. Semar Pegulingan–Gambuh" was released in 1983 by the label Le Chant du Monde (LDX-74802). It is thus certain that Mâche presented the original recordings to Xenakis.
[65] "Moi j'avais fait un voyage en Indonésie en 1972 et j'en ai ramené des enregistrements que j'ai publié au Musée de l'Homme, dans la collection du Musée de l'Homme Gamelan Balinais. Et j'avais fait entendre ça à Xenakis, ça lui a peut-être donné envie aussi d'y aller..." (Mâche, interview by author, 2020).
[66] Xenakis was accompanied by Françoise (his wife), Jolas by Gabriel Illouz (husband), Takemitsu by Asaka (wife) and Maki (daughter), Fleuret by La Grange.

extraordinary.[67]

Fleuret and La Grange were fascinated by the traditional arts in general and Indonesian performative arts in particular and had traveled to the country before (in 1970, for example, they went to Java, Singapore, and Ceylan–actual Sri Lanka) and also after. They were even constantly contacting artists to program their spectacles in the festivals and events they were coordinating and organizing, the reason why they were mainly responsible for planning the trip. As Fleuret (1978) described, "It has been six years since I went back to Bali. At that time, I took Betsy Jolas, Xenakis, Takemitsu, and Marie-Françoise Bucquet with me. For three weeks, we ran around the villages, the hamlets, the rice fields, in search of the musical wonders that Colin Mac Phee points out and analyzes in his monumental Music in Bali"[68].

Xenakis' trip to Indonesia lasted less than a month, and, as indicated in his passport, the composer asked for a visa at the Indonesian embassy in Paris on December 15, 1972[69]. He then entered the country by Jakarta (Java) on December 24, 1972, with permission to stay for two weeks. He then traveled to Denpasar (Bali) the same day and stayed on the island until at least the 30; between December 31 and January 2, they started to travel through Java and finished the trip in Jakarta, then exiting the country with his wife on January 5, 1973. However, the rest of the group would stay some days more in Java (until January 9)[70].

Xenakis produced two kinds of direct documentation during this journey: textual and drawn (in the "Carnet 38" of the *Collection Famille Iannis Xenakis*, herein referred to as "Notebook 38") and recorded (eight cassettes stored in the BnF)[71]. Notebook 38 contains drawings about Indonesian culture and architecture (Figs. 1.10, 1.11, 1.12 and 1.13).

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[67] "Henry-Louis de La Grange et Maurice Fleuret avaient fait ce voyage eux-mêmes et tous les deux ont décidé... c'était parmi les voyages que Henry-Louis de La Grange offrait à Maurice Fleuret pour son anniversaire. C'était un voyage surprise en quelque sorte. Ils ont été tous les deux tout à fait fascinés par Bali et ils ont décidé d'en faire profiter leurs amis compositeurs mais de façon tout à fait musicale... C'est à dire que ce voyage a été préparé très soigneusement, surtout par Henry-Louis de La Grange ; il avait un correspondant à Bali qui a vraiment balisé le terrain avant notre arrivée. Ce qui fait qu'on était littéralement attendus dans les villages où nous allions et ces villages étaient en fête pour nous recevoir ! On était reçu comme des stars. C'était extraordinaire ! On n'arrêtait pas, tous les jours il y avait quelque chose... Alors il y avait les choses prévues pour lesquelles on allait en voiture et il y avait aussi les choses imprévues qui nous frappaient comme ça et qui étaient souvent extraordinaires." (Jolas, interview by author, 2021).

[68] "Il y a six ans que je ne suis retourné à Bali. J'avais alors emmené là-bas Betsy Jolas, Xenakis, Takemitsu et Marie-Françoise Bucquet. Trois semaines durant, nous avions couru les villages, les hameaux, les rizières, à la recherche des merveilles musicales que signale et analyse Colin Mac Phee dans son monumental Music in Bali" (Fleuret, 1978).

[69] Jolas (interview by author, 2022) stated that they started the trip from England and made a connection in the Middle East. The itinerary would initially pass by Athens but, because Xenakis was not allowed to enter the country, they had to change the connections.

[70] This is why some discrepancies can be observed between the documents and dates produced by Xenakis and Fleuret.

[71] Fleuret and La Grange also produced an extensive and systematic documentation during the trip. It is constituted by recordings, photos, letters, agendas and instruments that they archived in their personal collections. This material deserves a specific attention, but will only be partially referred here. Fleuret was also weekly publishing on the press his texts and critiques and had mentioned Indonesia culture in some of them (Fleuret, 1972a, 1972b, 1973, 1978, 1987), as La Grange did previously to the trip also (La Grange, 1971).

**a)** **b)**

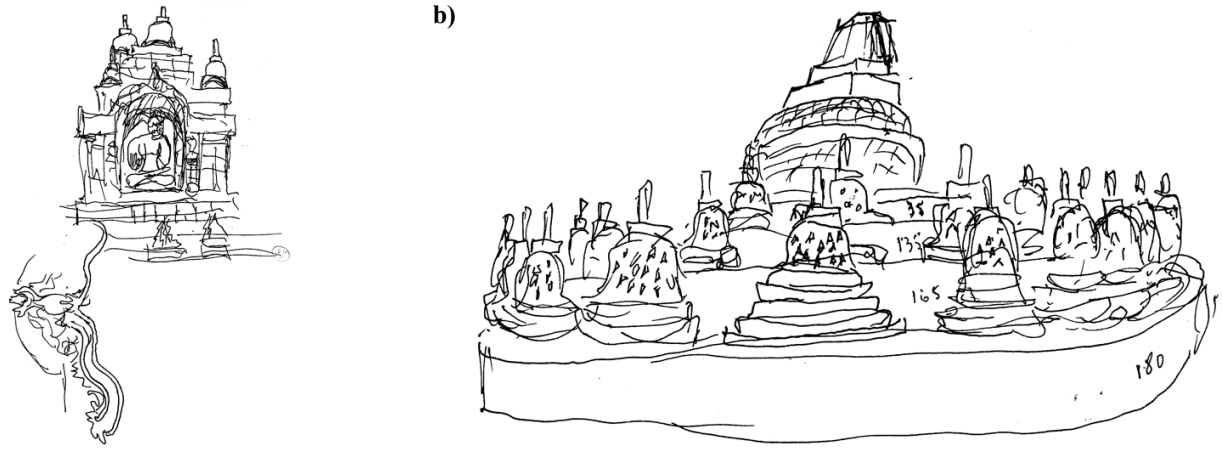

***Figure 1.10***. Xenakis' drawings of aspects of the Indonesian architecture. **a)** Statue of Buddha in Borobudur temple, Central Java. **b)** Part of the top of Borobudur temple, Central Java. Source of both: © Famille I Xenakis DR (Notebook 38, pp. 7-8).

There were no intense descriptions or significant texts containing personal impressions and thoughts, observations, or analyses (as was usual in his previous notebooks from the 1950s and 1960s). The notes made by Xenakis had few specifics about the trip, but it is perceptible that he tried to visually capture some moments and aspects of the events of every day (Fig. 1.11). It was more of a kind of visual register of the things that caught his attention and that had seemed relevant for him then.

**a)** **b)**

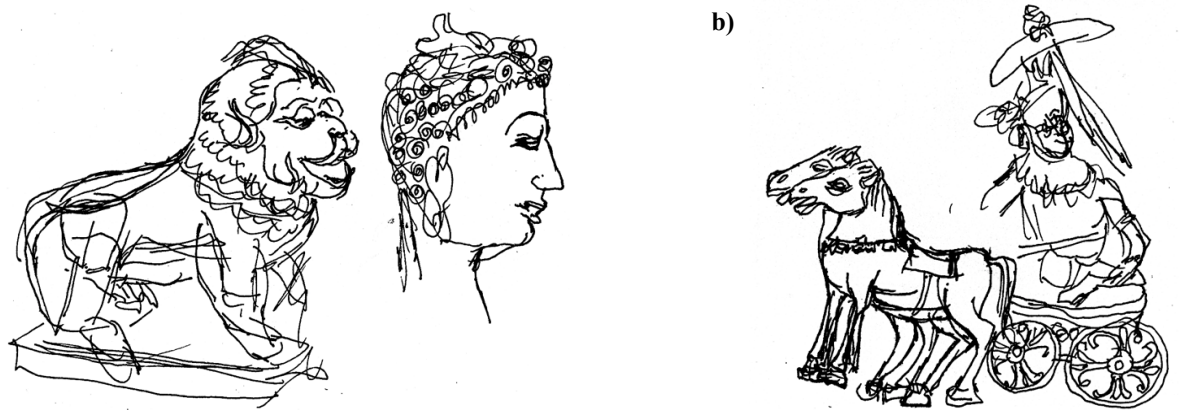

***Figure 1.11***. Xenakis' drawings of aspects of the architecture and culture in Indonesia. **a)** A lion guard statue and detail of a statue of Buddha's head, both probably from Borobudur temple, Central Java. **b)** Spectacle tied to the representation of the *Wayang wong*, based on excerpts of the Indian *Ramayana*. Source of both: © Famille I Xenakis DR (Notebook 38, pp. 6 and 10).

They attended various ceremonies and festivities, including the *Barong Ket*, *Barong Landung*, *Barong Celeng*, *Rejang* (a female ceremonial dance), and *Wayang kulit* (shadow play). They witnessed the traditional dance *Legong* and dance/theater performances such as the traditional masked dances *Gambuh*, *Reog* (or *Réyog*), and *Topeng*, as well as the *Wayang wong* (based on Hindu *Ramayana*). The *Barong Ket* and the *Legong* dance, for example, are referred to in Xenakis' travel notebook (Fig. 1.12) and are represented with drawings of the *Barong* (a mythical creature whose

role is performed by two people that use a single costume) and the *Rangda* (which represents a witch, the sworn enemy of the *Barong*, with both often clashing during danced rituals)[72].

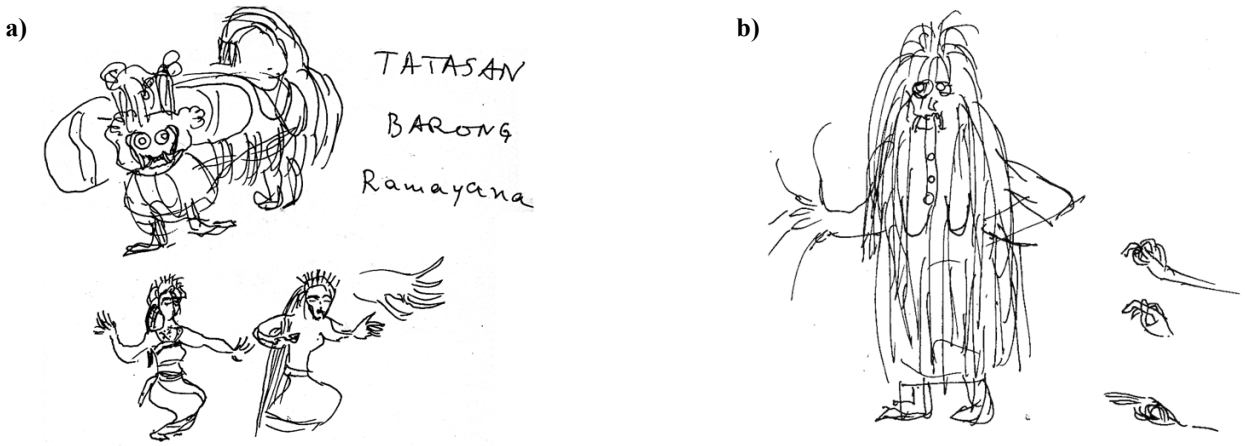


***Figure 1.12***. Xenakis' drawings of visual aspects of the *Barong* dance. **a)** The *Barong* at the top, with two dancers possibly representing the *Legong* dance, and details of the hand gestures at the bottom. **b)** Costume of *Rangda* and some details of the hand gestures with the long nails. Source of both: © Famille I Xenakis DR (Notebook 38, pp. 3 and 5).

They encountered different practitioners of traditional arts, such as I Nyoman Kakul (1905–1982), a master of traditional dance in Batuan, and Gde Manik (1912–1984) in Jagaraga. Gde Manik was a fundamental figure in the development and diffusion of the *gamelan gong kebyar* style[73]. In Xenakis' recordings, one can recognize that he heard many different gamelan groups in different locales. Xenakis dedicated a page in his notebook to gamelan instruments (names and some basic characteristics), showing how instrumentalists would install themselves to play under a *pendhapa*[74] (Fig. 1.13a). This page has descriptions of two different places and gamelans. The upper part could be a mention of "Gong Lelambatan Kuno Geladag & Pinda" from the village of Pindha, Bali (one of the most famous and traditional kebyar-style groups in the region). In the lower part, he indicates a group playing under a *pendhapa* that he called "Sekarsandat Gong at Sulanan [sic]," as a possible reference to the Sekar Sandat ensemble from Bangli village that they saw in Sulahan. The composer

[72] All of the artistic events witnessed during this trip led Xenakis to characterize them as a form of "total theater" several times. With this term, he indicated a form of artistic expression in which music, poetry, dance, action, visual arts, and theater are intricately interwoven and sometimes hardly separable. For him, the strength would also be characterized by the fact that, even if the internal elements would be separate, each one would keep its interest because of its strong coherence and profound content. As he stated later, "Today, total theater, with that life and inner harmony that defines it, exists in my opinion only truly outside the West—in Japan, in Java, in India itself, possibly in Africa". Original text: "Aujourd'hui, le théâtre total, avec cette vie et cette harmonie interne qui le définissent, n'existe à mon sens véritablement qu'à l'extérieur de l'Occident, – au Japon, à Java, en Inde même, éventuellement en Afrique." (Xenakis, 1991, p. 33).

[73] As Tenzer (2011, p. 28) described, "The most significant musical event from the early part of the Dutch period was the birth of the *gamelan gong kebyar* in the villages of North Bali around 1915. This gamelan, a radical modernization of the standard temple orchestra, swept Bali in the following decades. *Kebyar* style became the *lingua franca* of Balinese music as no other type of orchestral repertoire had before. The high speed and virtuoso pyrotechnics of kebyar music are quintessentially 20th century in flavor, and bear the unmistakable stamp of a music at long last released from the precious refinery of aristocratic environs."

[74] A *pendhapa* or *pendopo* is a kind of a large square or rectangular pavilion-like structure built on columns. It is a place used for collective ceremonies, community activities, and, for example, receiving guests, as was the case with the group of musicians with whom Xenakis visited the island in that year.

mentioned the village of Pindha during a visit on December 25 and wrote “Lambatan” (sic); he also drew some schemes of the instruments ceng ceng (which he called “teing teing”), kendang, reyong (he wrote “Ryong”), and jegogan (“djegogan”) and noted the names of others (trompong and kantilan). All of these instruments, except for the kendang, are metallic ones. A term at the bottom of these drawings seems to indicate the name of the piece they heard, he possibly tried to write “Pelayon” (Fig. 1.13b).

**a)**


**b)**

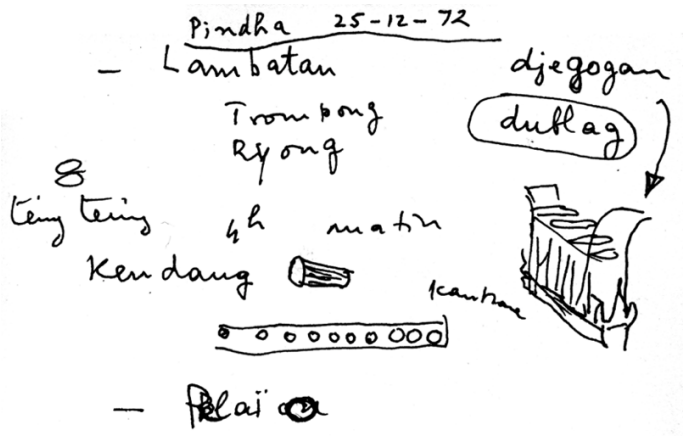


***Figure 1.13***. Xenakis’ drawings of musical aspects that he perceived in Indonesia. **a)** Names of a set of instruments at the top and the locale of a rehearsal or presentation of a gamelan at the bottom. **b)** Detail showing the ceng ceng, kendang, reyong, and jegogan. Source: © Famille I Xenakis DR (Notebook 38, p. 2).

The eight tapes recorded by Xenakis are stored in the BnF, and they are registered under the identifiers DONAUD 0602: 753–Xenakis 800, 754–Xenakis 801, 777–Xenakis 826, 837–Xenakis 888, 840–Xenakis 891, 868–Xenakis 919, 1053–Xenakis 920, and 1053–Xenakis 1110. These tapes demonstrate many aspects of his journey, as Xenakis recorded the performances they saw (Fig. 1.14) and interviews and discussions with locals (in French or English). As will be shown in the following, he also noted different kinds of information about the music with which they made contact.

***Figure 1.14***. Part of Xenakis’ group of friends who were traveling in Indonesia in 1972-1973. Seated from left to right in the foreground are: Betsy Jolas, Iannis Xenakis, Marie-Françoise Bucquet, and Toru Takemitsu. Source: © Famille I Xenakis DR.

He occasionally left his tape recorder running as they drove around a town or village. In these excerpts, one can hear conversations, vehicles, the sounds of passers-by, and all sorts of ambient noises. As explained by Jolas (interview by author, 2021):

> I think that for Maurice Fleuret, who had a devouring passion for Xenakis and his music [...], something absolutely had to remain of this historical journey. You see, there is also Takemitsu... So, we were really in this atmosphere where everything was important, we had to record. So, I took a lot of notes, trying to understand how this music worked. I hadn't documented it at all before. So, I don't know about Iannis, but I was very surprised at the way he recorded. He was walking around all by himself with his tape recorder on, on all the time. I mean, he never put notes or markers in it. He had to go back to France with miles and miles of recordings, which obviously bore fruit, but I think he didn't classify anything there. He recorded everything. I didn't ask him. I know that he was interested in everything, he was very undisciplined...[75]

Yet even with his "undisciplined" method, Xenakis captured the atmosphere of many moments of this journey. Moreover, he succeeded in preserving various moments of the trip and made it possible, in an obvious way, to understand part of what they visited and experienced during their stay. An important excerpt (in the recording registered as DONAUD 0602 753—Xenakis 800) shows the musicians comparing keys of gamelan instruments, trying to understand the tuning system and the characteristic properties of the set of instruments. They compared different instruments and different registers (possibly the jegogan, calung, and kantilan), always emphasizing the internal tuning differences between *polos* and *sangsi* (see Chapter 7–Subchapter 7.5 for more details) and the non-tempered character of the instruments. During the trip, Fleuret's documentation attests to a visit to a *pandé gong* (gamelan constructor). This fact points to an interest in the construction of gamelan instruments and the metal's shape and tuning (Jolas addresses this visit below). Another interesting excerpt (DONAUD 0602 1053–Xenakis 920) documents a visit to the kraton (royal palace) of Yogyakarta. There, they saw several groups of varying styles from various regions perform. In the middle of the recording, it is perceptible that Henry-Louis de La Grange[76] gave a small explanation of the scales and instruments. They must have all been on stage and among the instruments because he explained how scales and pitch relationships worked by asking the musicians to play certain passages and note sequences. At this point, De La Grange explained:

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[75] "Je crois que pour Maurice Fleuret qui avait une passion dévorante pour Xenakis et sa musique [...] Il fallait absolument que quelque chose reste de ce voyage historique. Vous voyez, il y aussi Takemitsu... Donc on était vraiment dans cette atmosphère où tout était important, il fallait enregistrer. Alors moi j'ai pris énormément de notes en essayant de comprendre comment cette musique fonctionnait. Je ne m'étais pas du tout documentée avant. Alors je ne sais pas pour Iannis, mais j'étais très étonnée de la façon dont il enregistrait. Il se promenait tout seul partout avec son magnétophone ouvert, ouvert constamment. Je veux dire il ne mettait jamais de notes ou de repères. Il a dû rentrer en France avec des kilomètres d'enregistrements, qui ont porté des fruits évidement mais je crois que sur place il ne classait rien. Il enregistrait tout. Je ne lui ai pas posé la question, je sais qu'il s'intéressait à tout, il était très indiscipliné […]" (Jolas, interview by author, 2021).

[76] As De La Grange visited Indonesia previously and had also organized this trip for and with Fleuret, he often served as the host for the events. In addition to explaining what was to take place, he also described places, objects, artistic manifestations and historical context.

> We are here in a part of the palace of Yogyakarta, the palace of the sultan. We are going to hear a complete gamelan orchestra, an ancient orchestra. So, this family of instruments that are gongs on a frame are called bonangs. [The musicians play a sequence of notes] So what we just heard was the first of the Javanese modes, which is the pelog. Now we're going to hear the slendro. [Musicians play a sequence of notes] So this series of large Western gongs that are also placed on frames, which are each individual, each of a different pitch, are called kenongs. [The musicians play a sequence of notes] This is one of the scales, and the other one is [The musicians play a sequence of notes, which is when Xenakis says:] "Ah! That's it, it's in the octave!"[77]

These are fascinating records because they show that, on different occasions, the composers who were present had access to the instruments, experimented with their playability, and tried to understand the particularities of their tuning. It is not only the content of the records that seems interesting but also how Xenakis tried to retain additional information with this kind of source (Fig. 1.15).


***Figure 1.15***. Some of the recordings produced by Xenakis on his trip to Indonesia. **a)** Two tapes showing additional information noted by Xenakis. **b)** Detail of the cassette called "Bali nord" (DONAUD 0602 753–Xenakis 800). **c)** Detail of the cassette called "Jogjak sultan" (DONAUD 0602 1053–Xenakis 920). Source of all: BnF. Photo by the author.

As visible above, he wrote on these cassette tapes excerpts of scales that were part of the recordings. In his archives at the BnF, there are two cassettes (identified as DONAUD 0602 753–Xenakis 800, cassette called "Bali nord" by Xenakis, and DONAUD 0602 1053–Xenakis 920, called "Jogjak sultan") on which he marked the typical scale of the recorded music and showed through

[77] "Nous sommes ici donc dans une partie du palais de Yogyakarta, du palais du sultan. Nous allons entendre un orchestre de gamelan complet et d'ailleurs un orchestre ancien. Alors, cette famille ci d'instruments qui sont des gongs posés sur un cadre s'appelle des bonangs. [The musicians play a sequence of notes] Alors ce que nous venons d'entendre c'était le premier des modes javanais, qui est le pélog. Maintenant nous allons entendre le slendro. [The musicians play a sequence of notes] Alors, cette série de grands gongs occidentaux qui sont posés aussi sur des cadres, qui sont chacun individuels, chacun d'une hauteur différente, s'appelent les kenongs. [The musicians play a sequence of notes] c'est une des gammes et l'autre elle est [The musicians play a sequence of notes, which is when Xenakis says:] Ah ! Ça y est, c'est à l'octave !"

indicator arrows where the music based on that scale appears in the recording. It is remarkable thus how he tried to store and connect as much information as possible about the music he experienced during the trip. He indicated the scale type by comparing *slendro* and *pelog* in the same recording (Fig. 1.15c). He also indicated the pitches as precisely as possible within his mode of notation by using indications for higher or lower quarter tones (see more details in Chapter 3–Section 3.3.1).

It is perceptible that Xenakis made a great effort to understand, in a practical way, how the traditional scales are organized and how the tuning systems are created and applied. More than that, he tried to register and save information that seemed fundamental, and, as discussed later, those materials partially returned in his later composition and more than one piece (see more details in Chapter 7–Subchapter 7.1). About this interest in capturing aspects of the trip, Betsy Jolas (interview by author, 2021) mentioned:

> I think Xenakis was interested in his own way. We each had our own way of hearing; he also tried out instruments. I remember we went to a factory of tuned gongs, and there was an extremely low wide gong that fascinated me [...] And this is something that I had never had the opportunity to try out in the West. [...]
> I was very impressed by the tuning of the instruments, which was obviously not at all that of the Western instruments, and I had a lot of trouble to get back to a European context. It took me a few weeks to get back into it... In fact, I had not prepared this trip at all from a musical point of view. I had not documented myself at all. I took notes, and it's mostly when I came back that I looked at my notes and compared them with McPhee's books.[78]

This "opportunity to try" had never transpired before, and it inspired the composers on the trip. Jolas (interview by author, 2021) mentioned that this journey changed many things in terms of her compositional approach, and it stayed deeply rooted in her memory. As she also mentioned in a 1999 interview (Serrou, 2001, pp. 230-231):

> I hadn't really researched this country and its music before going there. It was a dazzling experience that I will keep track of—non-musically!—in many of my later works. What attracted me to this music was a "way of life," those moments when suddenly one starts in what seems a delirious improvisation to then operate a dramatic slowing down, and also the solemnity of the gong strokes to mark the phrases... The effect of all this will be found in *B For Sonata*, "the great piece" of which I dreamed, composed for Marie-Françoise Bucquet [...] who wanted a piece with the name "Sonata" to be included in a program on this theme—*B For Sonata*, that is to say: "Bali as a sonata". [...] This title is literally Bali as a sonata.[79]

[78] "Je pense que Xenakis s'intéressait à sa manière. Nous avions chacun notre manière d'entendre, il essayait lui aussi des instruments. Je me rappelle on est allé dans une fabrique de gongs accordés et il y avait un gong large extrêmement grave qui m'avait fasciné […] Et c'est quelque chose pour laquelle je n'avais jamais eu l'occasion de tâter ces instruments en occident. [...] Il y a eu, chez moi en tout cas, j'ai été très impressionnée par l'accord des instruments qui était évidemment pas du tout celui des instruments occidentaux et j'ai eu beaucoup de mal à me remettre à un contexte Européen. Ça a pris quelques semaines pour m'y remettre… En fait je n'avais pas du tout préparé ce voyage du point de vue musicale, je ne m'étais pas du tout documentée. C'est sur place que je me suis documentée, j'ai pris des notes et c'est surtout en rentrant que j'ai regardé mes notes et que j'ai confronté à des livres de McPhee." (Jolas, interview by author, 2021).

[79] "Je ne m'étais pas vraiment documentée sur ce pays et sa musique avant de m'y rendre. Ce fut un éblouissement dont je garderai trace – non musicologique ! – dans bien des œuvres ultérieures. Ce qui m'avait attirée dans cette musique, c'était une « manière de vivre », ces moments où tout à coup on part dans ce qui semble une improvisation délirante pour ensuite opérer un dramatique ralentissement, et aussi la solennité des coups de gongs pour marquer les phrases... L'effet de tout cela se retrouvera dans *B For Sonata*, « la grande pièce » dont je rêvais, composée pour Marie-Françoise Bucquet

Thus, different Jolas' pieces, such as *B for Sonata* (1973), which was composed just after her return from Indonesia, were directly influenced by this trip. In addition, concerning *Quatuor VIII à cordes "Topeng"* (2019), a more recent piece, she explains the connection: "I recently wrote a quartet called *Topeng*, that is to say, the Balinese theater which impressed us all. We were all very marked by this trip. So, I stop talking about myself, but Iannis was clear, he was absolutely in another universe."[80] (Jolas, interview by author, 2021).

For Toru Takemitsu, the trip was also an important stimulus for reflection on music in general and his music in particular. In an interview with Xenakis in October of 1986, he stated, "I started to think about the scales of Japanese traditional music after various experiences, like the trip we made together in Indonesia"[81] (Takemitsu, 2018, p. 346). In a different text that discusses ties between Eastern and Western music, the Japanese composer addressed the aspects of historical changes in musical instruments, making a parallel between non-European traditions and the non-standardization of instruments. He expressed that:

> As far as the history of Western music is concerned—if I describe it roughly—it achieved great universality about four hundred years ago thanks to the elaborated and standardized equal temperament. At the same time, instruments were improved or newly created. This is indeed modernization and functionalism. However, it is a fact that in the process of making all instruments more practical and functional, many important things were abandoned. The modern music born in Europe must also have had, in the past, fine intervals that cannot be realized on today's instruments like the piano or the idea of a particular sound born in special conditions of a local region. [...] I had the same impression before when I walked in a mountainous region of Indonesia and listened to local music in many hamlets. Nevertheless, the Indonesian music I listened to was very refined and somehow functional and coherent[82] (Takemitsu, 2018, p. 148).

As Burt (2001, p. 128) affirmed when referring to the composition of *For Away* (1973), "The experience affected Takemitsu deeply, not only on a philosophical level but musically too, inspiring the only reference to an 'Eastern' musical tradition other than Japanese to be found in Takemitsu's writing for the concert hall." Asaka Takemitsu also reinforced this in her memoir about her husband,

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[...] qui voulait une pièce portant le nom de « Sonate » à inclure dans un programme sur ce thème – *B For Sonata*, c'est à dire : « Bali comme sonate ». [...] Ce titre est littéralement *Bali en guise de sonate*." (Serrou, 2001, pp. 230-231).

[80] "j'ai écrit tout récemment encore un quatuor qui s'appelle *Topeng* c'est-à-dire le théâtre Balinais qui nous avait tous impressionnés. On a tous été très marqués par ce voyage. Alors j'arrête de parler de moi, mais Iannis c'était clair, il était absolument dans un autre univers." (Jolas, interview by author, 2021).

[81] "Moi-même, j'ai commencé à réfléchir sur les échelles de la musique traditionnelle japonaise après diverses expériences comme le voyage que nous avons fait ensemble en Indonésie." (Takemitsu, 2018, p. 346).

[82] "En ce qui concerne l'histoire de la musique occidentale, – si je la décris grossièrement – elle a obtenu une grande universalité il y a environ quatre cents ans grâce au tempérament égal élaboré et standardisé. Parallèlement à cela, les instruments étaient améliorés ou d'autres nouvellement créés. Il s'agit bien de la modernisation et du fonctionnalisme. Toutefois, il est de fait que, à force de rendre tous les instruments plus pratiques et plus fonctionnels, on a abandonné aussi beaucoup de choses importantes. La musique moderne née en Europe devait également avoir, autrefois, des intervalles fins qui ne peuvent pas être réalisés sur les instruments d'aujourd'hui comme le piano, ou l'idée d'un son particulier né dans de conditions spéciales d'une région locale. [...] J'ai éprouvé la même impression, auparavant, quand j'ai marché dans une région montagneuse d'Indonésie et écouté de la musique locale dans de nombreux hameaux. Néanmoins, la musique indonésienne que j'ai écouté était très raffinée, et d'une certaine manière fonctionnelle et cohérente." (Takemitsu, 2018, p. 148).

in which she expressed that the composer was impressed by traditional Balinese music (Takemitsu, 2010, p. 162).

Takemitsu (2018, p. 38) himself made some references to the trip, stating: "Two years ago, I traveled to Indonesia with some French musicians. After hearing the Balinese gamelan, one of them excitedly told me: These are our new resources!"[83] Who was expressing this concern about new resources at this specific moment is not very clear in the text, but it seems that this journey affected all composers with respect to their work. This is perceptible in another context, as the result of an interview with Xenakis in October 1986, when Takemitsu (2018, p. 345) affirmed: "We traveled together in Indonesia. We shared the same emotion in discovering various musics there. However, to translate this emotion into music, you took a very intellectual approach, detached from a simple emotional impulse."[84] He then asked Xenakis to express his thoughts and concepts concerning non-European music, and his answer to the Japanese composer started with: "The question of scale is the basis of all music. Each culture has its instruments that produce different scales. The same can be said of European music"[85] (Takemitsu, 2018, p. 345). As will be evident in later chapters, this answer is very symptomatic of what in Indonesian music traditions eminently captured the attention of Xenakis when producing in the second half of the 1970s: scales and the instruments that produce them.

Xenakis was also profoundly transformed by this journey, and as a result, his music was, too. It also reinforced many aspects of his previous thinking and approaches that he had expressed at least since the 1960s at the East-West Music Encounter and the Symposium Musics in Asia. As the composer himself expressed when asked if he was attached to a current or a tradition:

> I am attached to the artistic tradition, I hope, of the whole world. Because I love traditional music, whether it is from Japan, China, Java, Bali, Africa, etc. These are essential things for me, and there are discoveries that I made from elsewhere that are really universal things.[86] (Xenakis, 1992b).

An essential new period of his work progressively appeared after the trip and was markedly influenced by, among other things, this experience. As Solomos (1996, p. 63) emphasized, "The 1970s mark the apotheosis of Xenakis' repertoire, of which it is impossible, within the framework of a concise book, to retrace even the most important stages."[87] Solomos pointed to two specific factors

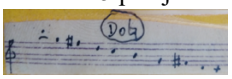
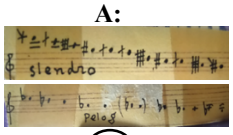
[83] "Il y a deux ans, j'ai voyagé en Indonésie avec des musiciens français. Après l'audition du gamelan balinais, l'un d'eux m'a dit avec excitation : « Ce sont nos nouvelles ressources ! »" (Takemitsu, 2018, p. 38).
[84] "Nous avons voyagé ensemble en Indonésie. Nous partageons la même émotion en y découvrant diverses musiques. Toutefois, pour traduire cette émotion en musique, vous menez une démarche très intellectuelle, détachée d'une simple impulsion émotionnelle." (Takemitsu, 2018, p. 345).
[85] "La question de l'échelle est la base de toutes les musiques. Chaque culture a ses propres instruments qui produisent des échelles différentes. On peut dire exactement le même chose de la musique européenne." (Takemitsu, 2018, p. 345).
[86] "Je me rattache à la tradition artistique, enfin j'ose espérer, du monde entier. Parce que j'aime beaucoup la musique traditionnelle, que ce soit du Japon, de Chine, de Java, de Bali, d'Afrique, etc. Ce sont des choses primordielles pour moi et il y a des découvertes que j'ai fait d'ailleurs qui sont vraiment des choses universelles." (Xenakis, 1992b).
[87] "Les années 1970 célèbrent l'apothéose de la renommée de Xenakis, dont il est impossible, dans le cadre d'un ouvrage concis, de retracer même les étapes les plus importantes." (Solomos, 1996, p. 63).

that, according to him, stimulated this productive period in Xenakis' career: the first time that he returned to Greece after the withdrawal of his death sentence in 1974 and the festival produced by the French Ministry of Culture and Communication taking place over a month that was dedicated entirely to his work, the Cycle Iannis Xenakis in 1977. Psychologically and emotionally, they were extremely important, but the journey to Indonesia also resulted in specific changes in his composition by giving him materials that he would use in his works (directly or indirectly). Many imaginative and artistic aspects of Indonesian music impacted pieces he composed in the 1970s and 1980s, with *Pléïades* as one of them. Xenakis' perspectives on the organization of pitch, timbre, and formal structures are some of the aspects discussed later (Chapters 6 and 7).

### 1.2.1 Xenakis' and Fleuret's recordings

The material Xenakis recorded is preserved in eight cassettes stored at the BnF, while Fleuret's recorded documentation consists of fifteen tapes preserved at the BLGF. Xenakis' material is presented in Table 1-1, being there briefly described to provide some additional details about the trip to Indonesia. The sequence presented in this table is according to the order of the regions the group visited (Bali, then Java), as mentioned by Jolas and corroborated by Xenakis' records. The trip sequence that Jolas mentioned (Bali before Java) makes sense because the cassette DONAUD 0602 840—Xenakis 891 shows the transition between the region of Denpasar (the village of Sesetan is mentioned) in South Bali and Yogyakarta in Central Java. Some sequences are clear because Xenakis himself referred to the continuity of the recordings in the next cassette (such as in the passage from DONAUD 0602 1053—Xenakis 920 to DONAUD 0602 1053—Xenakis 1110, with his mentions of "*la suite sur Sony*" and "*suite du violet 1*"). These recordings contain numerous excerpts of gamelan music, and they are all mainly filled with the musical performances they experienced. A statement of each time a gamelan was heard is impossible because this occurred all the time. There are recordings of gamelan groups on each side of every cassette.

***Table 1-1***. Xenakis' recordings of the 1972-1973 trip to Indonesia archived at the *Bibliothèque nationale de France* (BnF).

| Title on tape by Xenakis | Complement on tape by Xenakis | Localization mentioned | Brief description | BnF identifier<br>Photo of the tape |
|---|---|---|---|---|
| **A:** BALI<br>BALI NORD | **A:** p 135 mārāwā<br>215 paraj<br>  | **A:** | **A:** Tests on scales and tunings of gamelan instruments (this recording is potentially tied to Notebook 38, p. 2) | DONAUD 0602 753–<br>Xenakis 800<br>  |
| **B:** BALI NORD<br>Singaradja | | **B:** Singaraja, Jagaraga Gondoral | **B:** Meeting and hearing the *Gong Kebyar* directed by Gde Manik (Jagaraga) | |
| **A:** Gong du roi de Bangli Galangaki chanson d'aube à Sulahan //<br>TATASAN Barong | | **A:** Sulahan | **A:** No mentions, but a *Wayang kulit* presentation was possibly recorded (recording potentially tied to Notebook 38, pp. 2-3) | DONAUD 0602 754–<br>Xenakis 801<br>  |
| **B:** suite TATASAN Barong | | **B:** Pujon (East Java) | **B:** Mentions of the *Ramayana* and *Wayang kulit*, aleatory soundscape recording | |
| **A:** BALI | | **A:** Kebisas | **A:** Discussion about gamelan instruments and their positioning | DONAUD 0602 868–<br>Xenakis 919<br>  |
| **B:** BALI | | **B:** Batuan | **B:** Mentions of the *Topeng* and Noman Kakul | |
| **A:** BALI transe<br>JOG JAG danse | | **A:** Sesetan village (near Denpasar); Yogyakarta (Central Java) | **A:** Mentions of the *Barong Celeng* and the *Barong Landung*; mentions of dance in a visit to the ASKI | DONAUD 0602 840–<br>Xenakis 891<br>  |
| **B:** Jogjag Danse<br>Aski suite | | **B:** Yogyakarta | **B:** Mentions of dance performances and traditions; tests on scales and tuning of gamelan | |
| **A:** Jogjak sultan<br>la suite sur Sony | **A:**<br>  <br>LA | **A:** Yogyakarta | **A:** Mentions of the Kraton of Yogyakarta; hearing of Javanese the modes of *pelog* and *slendro* | DONAUD 0602 1053–<br>Xenakis 920<br>  |
| **B:** JOGJAG concert au palais KRATON | **B:**<br>LA | **B:** Yogyakarta | **B:** Mentions of dance performances | |
| **A:** JOGJAG Dance sultan<br>suite du violet 1 | | **A:** Yogyakarta | **A:** Mentions of dance performances and *Ramayana* (recording potentially tied to Notebook 38, p. 10) | DONAUD 0602 1053–<br>Xenakis 1110<br>  |
| **B:** Solo Aski<br>kariwitan | **B:** ┐ *pelog* rebab<br>LA | **B:** Surakarta (West Java) | **B:** Mentions of dance performances at the ASKI | |
| **A:** Théâtre d'ombre, Java<br>SOLO KRATON<br>**B:** | | **A:** Surakarta | **A:** Mentions of *Wayang kulit* based on traditional *Mahabharata* texts at the ASKI | DONAUD 0602 777–<br>Xenakis 826<br>  |
| **A:** Java 3<br>H. Louis de La Grange<br>**B:** | | **A:** Surakarta, Palimanan (near Cirebon), Sumedang | **A:** Mentions of *Rejok* at Surakarta<br>**B:** Aleatory soundscape recording | DONAUD 0602 837–<br>Xenakis 888<br>  |

The recordings' organization indicates specific events and encounters. It is then evident that they heard the Gong Kebyar directed by Gde Manik at the beginning of the trip, that they observed the *Topeng* with Noman Kakul in his village (Batuan), and that they stayed for a long time as spectators at the ASKI (Indonesian Academy of Music[88]) and the Solo Kraton (Royal Palace of Surakarta). Xenakis dedicated time to recording in these specific places. They also observed performances of *Wayang kulit*, *Rejok*, *Barong Celeng*, and *Barong Landung*. The Table 1.1 highlights details pertinent to the present discussion. Thus, the interest of the composers in the tuning and scales of different gamelans is made clear. Because of this interest, it is perceptible that three events were specifically organized. In two of them, the composers personally tried out the instruments, and on one occasion, professional musicians presented the musical elements along with an explanation by Henry-Louis de La Grange. They tried out instruments and tunings in Northern Bali (DONAUD 0602 753—Xenakis 800; this record is potentially tied to Notebook 38, p. 2) and Yogyakarta at ASKI (DONAUD 0602 840—Xenakis 891). In the Kraton at Yogyakarta (DONAUD 0602 1053—Xenakis 920), the modes of *pelog* and *slendro* were specifically presented and exemplified with different pieces from the Javanese repertoire.

Fleuret also produced important documentation about the trip. This material was not previously analyzed or discussed, which is why the identifiers classified by BLGF are still informal and are, until now, indications of Fleuret himself. He returned many times with new notes and observations about it (and his assistant might have done it as well because there are notes in different handwriting), trying to register as much information as possible. In any way, the documentation established with Fleuret's recordings attests to the activities with the dates and periods of the day, bringing more specifics about each moment of the trip. Table 1-2 highlights the information about the trip that Fleuret tried to gather in chronological order.

Further analysis of more information and details from documents produced by Fleuret and La Grange could better elucidate specific aspects of the trip. For instance, this material helps to understand better the group's itinerary and the aspects of the places visited, as well as the performative arts and exchanges experienced. A deeper approach could highlight more details about the trip and could explain some discrepancies that seem to appear when comparing both documents. This material certainly deserves more attention and a specific methodological approach.

[88] This institute was created in 1964 under the name *Akademi Seni Karawitan Indonesia* (ASKI—Karawitan Arts Academy of Indonesia). It opened a Bachelor's degree program in 1973 and underwent a nominal and structural change in 1988, becoming the *Sekolah Tinggi Seni Indonesia Surakarta* (Indonesian Arts College of Surakarta). This institution has now been known as *Institut Seni Indonesia, Surakarta* (ISI Surakarta—Indonesian Institute of the Arts Surakarta) since 2006.

***Table 1-2***. Maurice Fleuret's tapes of the 1972-1973 trip to Indonesia stored in the *Bibliothèque La Grange-Fleuret* (BLGF).

| **Island visited: Date (period)** | **Localization mentioned** | **Title or brief description on tape by Fleuret** | **BLGF identifier** |
|---|---|---|---|
| **Bali:** | | | |
| 25.12.72 (morning) | Pindha | gamelan gong kebiar style<br>Lelambatan ensemble–*Pelayon* (title) | I |
| 25.12.72 (morning) | Pindha | *Manuk Anguci* (title)<br>Gong Gede de Sulahan (first piece): *Tabuh telu* | III |
| 25.12.72 (morning) | Pindha | Gong Gede de Sulahan: *Tabuh pav* + Selisiran | IV |
| 25.12.72 (afternoon)<br>26.12.72 (afternoon) | Pindha<br>Pudjung | end of Gong Gede de Sulahan: examples of instruments<br>begining of Ramayana (Wayang wong) | V |
| 26.12.72 (afternoon) | Pudjung | Wayang wong (continuation) | 7 |
| 26.12.72 (afternoon) | Kedisan village<br>Tegalallang–Gianyar | Gambuh | 6 |
| 27.12.72 (evening) | Batuan | Topeng<br>Topeng Bajegan (solo) | 9 |
| 27.12.72<br>28.12.72 | Batuan | party at Batuan<br>ensemble from Singaraja<br>visit to a Pandé Gong (gamelan constructor) | 8 |
| 29.12.72 (morning)<br>28 or 29.12.1972 (evening) | Parang Sadé village<br>Penendjanan | saron ensemble<br>("bamboo saron + bronze saron")<br>Rejang dance | II |
| 30.12.72 (evening) | Batuan | Galestre genggong (guimbardes) and "frog spectacle" (ketiak?) | 10 |
| **Java:** | | | |
| 03.01.73 (evening) | Solo | Kraton<br>ASKI | 3 |
| 06.01.73 (afternoon) | Solo | Wayang Kulit | non-specified |
| 06.01.73 (afternoon) | Solo | Wayang Kulit<br>Reyok<br>gamelan from Sunda | non-specified |
| 08.01.73 (evening) | Bandung | music from Sunda<br>Damas ensemble | non-specified |
| 09.01.73 | Jakarta | | non-specified |

### 1.2.2 An itinerary through traditions and sounds

Assembling all the previous information and pointing to the map of Indonesia where the activities occurred, it is possible to perceive that the group of friends experienced many cultural manifestations from both islands and in different regions of the country. Essentially from North, Central, and South Bali, as well as from East, Central, and West Java (Fig. 1.16), the group had contact with the main regions of both islands. Thus, with all of the information provided by Jolas, recorded in tapes (by Xenakis archived at the BnF and by Fleuret/La Grange at the BLGF), collected in Notebook 38 (*Collection Famille Iannis Xenakis*) and Fleuret/La Grange's documents (BLGF), it is possible to indicate most of the locations visited. The directions of the trip are pretty straightforward

and corroborated by the recordings and the documentation. Thus, it indicates that they made an almost straight line from the North to the South of the island of Bali, as well as in a diagonal line from East to West Java, also visiting some places in Central Java, finally finishing in Jakarta, where the group would exit the country from.


***Figure 1.16***. Cities and villages visited in Bali and Java during Xenakis' trip to Indonesia, directions indicated by arrows.


***Figure 1.17***. Indication of the places visited during the 1972-1973 trip to Indonesia. **a)** Locations in Bali as indicated by Xenakis and complemented by Fleuret. **b)** Locations in Java as indicated by Xenakis and complemented by Fleuret.

The Balinese cities and villages mentioned in Xenakis' and Fleuret's documentation are Batuan, Gondoral, Jagaraga, Kebisas, Kedisan village, Penendjanan, Pindha, Pudjung, Sesetan, Singaraja, and Sulahan (Fig. 1.17a). Then, they traveled from East to Central to West Java over much larger

distances, and the Javanese cities and villages mentioned are Bandung, Cirebon, Palimanan, Pujon, Sumedang, Surakarta, and Yogyakarta (Fig. 1.17b).

The present chapter is the first in-depth discussion about Xenakis' trip to Indonesia in 1972-1973, pointing out many elements and important considerations about a significant period of his life. It is also the first to present different contexts in which the composer experienced Indonesian performative arts dating back to at least 1951, showing interactions specifically with gamelan music over the 1950s to 1970s. The information presented here matters because these elements became present in the central works of his career, turning into important parts of his theoretical and practical approaches.

Xenakis paid particular attention to the traditional music of different countries, and that of Indonesia was one of the most important for him, along with the traditions of India and Japan. This interest brought him to Indonesia in 1972, but he had already built a referential and background knowledge about the subject. From a passive posture as a listener and student in the 1950s, Xenakis passed to an active posture as an author in the 1960s, participating in the East-West Encounter in Tokyo (1961) and Musics of Asia Symposium in Manila (1966) and presenting works that would later be seminal texts in his thinking. This whole context influenced him to have a universalist point of view about music in general, but it also created in his perspective a sense of connection and correlation between Asian music and Greek traditions. This could have been stimulated during the East-West Music Encounter and may have been, at the very least, reinforced and improved during the discussions at the symposium Musics of Asia. Xenakis later mentioned these aspects (as something connected, integrated, and even amalgamed) in many interviews and discussions about his music, and they were expressly included in his introduction of *Pléïades*.

The conditions of the trip to Indonesia, albeit for a relatively short stay in the country, provided him with access to numerous local artistic manifestations, and he made a special effort to preserve the materials in his collection. In addition to Notebook 38 (*Collection Famille Iannis Xenakis*) and the eight tapes recorded in Indonesia (BnF), Xenakis kept many discs, books, and musical instruments in his private collection at home all over the subsequent years. His esteem and value for the recording is evident due to its meticulous preservation. This also occurred because the composer intended to be able to consult it when necessary, something that would occur some years later. As will be pointed out in other chapters, some of these materials were directly introduced in some of his pieces, showing that the composer returned to ancient memories as part of his creative process. Thus, this trip, as well as all of the different encounters that preceded it (the first contact with Indonesian music, Messiaen's classes, the events he participated in, the concerts he attended, and the people with whom he exchanged experiences), produced changes in his compositional practices from around the middle of

the 1970s. These changes primarily involved using scales but also an important change in Xenakis' interest in timbre and treatment.

Certain important elements are still missing to specify perspectives that could stimulate practical approaches in percussion performance. However, this chapter shows that Balinese and Javanese practices consumed Xenakis' imagination. His contact with many distinct Indonesian instruments, sonorities, and repertoires could incite some ideas and many potential artistic projects. A dialogue between Xenakis' pieces and Indonesian performance arts could be based on the context of his personal experiences. New practical perspectives can undoubtedly be reached from this point of view because, as pointed out in the previous subchapters, the composer heavily steeped himself in elements of Indonesian music at critical moments of professional development. Thus, those elements could question fundamental aspects of the interpretation of *Pléïades* and the production of Sixxen through a new approach (as addressed in Chapters 6, 7 and 8).

The discussion will continue with the presentation of the historical context, but the subject will focus then on the premieres of two versions of *Pléïades*, the ballet version, and the instrumental version. To that end, a jump has to be made from 1973 to 1977, when the *Opéra du Rhin* invited Xenakis to a new project with them. This invitation stimulated him so much that he wanted to compose a new piece for percussion and create a new instrument for the occasion.

# Chapter 2. *Pléïades*: genesis and first performances

*Pléïades* was created as part of the ballet *Le Concile Musical*, a collaboration with the *Opéra du Rhin* (Strasbourg, France) in 1979. The spectacle was a cooperation between the *Opéra*, the *Ballet du Rhin*, the group Les Percussions de Strasbourg, Iannis Xenakis, and the choreographer Germinal Casado. It is not very clear when precisely the idea surfaced and who imagined uniting the ballet, the composer, and the percussion ensemble, but many agents were crucial in bringing together these particular artists. The score and some authors have indicated that *Opéra du Rhin* commissioned *Pléïades* (Fleuret, 1988; Lacroix, 2001; Marandola, 2012), something also reinforced by the contract signed by the composer, but the full details of the project's beginning are not completely available. In an interview with Daniel Walther in 1979, Xenakis stated:

> The idea of bringing together in the same dance spectacle works by Gabrieli (1557–1612) and by a contemporary musician did not come from me but from Alain Lombart [sic]. But when he asked me to compose a 45-minute score, I was immediately interested, on the one hand, because I love Gabrieli, and on the other, because I liked the idea of working with the Percussions de Strasbourg[1] (Walther, 1979).

In an internal document from the Les Percussions de Strasbourg Archives, dating July 1982, Jean Batigne[2] (1933–2015) expressed that himself and Alain Lombard[3] commissioned a new piece by Xenakis. As he officially noted in the document: "XENAKIS at the *Opéra du Rhin*: May 79 Commission of the work by LOMBARD and me."[4] Georges van Gucht stated, "The commission, then we had a conductor at the Strasbourg orchestra, it was Alain Lombard, [...] It was he who decided with the city of Strasbourg to commission this piece for Les Percussions de Strasbourg, and he commissioned it from Iannis. Furthermore, the commission was paid for by the city of Strasbourg."[5] (van Gucht, interview by author, 2020). A later integrant of the ensemble also reiterates this, François Papirer, that stated:

> So, without being in the small details, it is Batigne (or the group but via Batigne) who wished to commission again a piece to Xenakis because the first one it was *Persephassa* ten years earlier, in 1969, and I would always remember this sentence of Batigne who said to him, to

[1] "L'idée de réunier dans un même spectacle de danse des œuvres de Gabrieli (1557-1612) et d'un musicien contemporain, ne vient pas de moi, mais d'Alain Lombart [sic]. Mais quand il est venu me demander de composer une partition de 45 minutes, cela m'a tout de suite intéréssé, d'une part parce que j'aime Gabireli, d'autre part parce que l'idée de travailler avec les Percussions de Strasbourg me plaisait." (Walther, 1979).

[2] One of the percussionists who founded the group Les Percussions de Strasbourg and its artistic director from 1962 until 1983.

[3] Alain Lombard arrived in Strasbourg in 1972 as the musical director of the Orchestre Philharmonique de Strasbourg (a position he held until 1983). He was the artistic director of the *Opéra du Rhin* from 1974 to 1980, and this was a position in which he was also responsible for the *Ballet du Rhin*.

[4] "XENAKIS à L'Opéra du Rhin : Mai 79 Commande de l'œuvre réalisée par LOMBARD et moi." (Jean Batigne, July 1982, p. 5).

[5] "La commande, alors on avait un chef d'orchestre à l'orchestre de Strasbourg, c'est Alain Lombard, [...] C'est lui qui a décidé avec la ville de Strasbourg de commander cette pièce pour les Percussions de Strasbourg, et il l'a commandée à Iannis. Et la commande a été payée par la ville de Strasbourg." (van Gucht, interview by author, 2020).

> Xenakis: "well listen we would like to ask you a new commission," Xenakis: "but why?" And Batigne would have said to him: "because you can do better"[6] (François Papirer, interview by author, 2019).

Fleuret (1988) further corroborated this when he expressed that the group always wanted a new piece by Xenakis to add to their repertoire after the uninterrupted success of *Persephassa* in 1969[7]. On the other hand, the *Ballet du Rhin*, directed by Jean Sarelli (1932–2006), had already planned a collaboration with the six percussionists. Created in 1972, the *Ballet du Rhin* had a repertoire mainly oriented toward Romantic and Neo-Romantic aesthetics. It was under Sarelli's direction (between 1978 and 1990) that its aesthetic and conceptual characteristics opened up to include those of a more modern repertoire and original creations, with *Le Concile Musical*, which was carried out with him as the director, being the first project with a complete and original creation (music and choreography). Thus, in this context and as a consequence of this mix of desires, *Pléïades* came into being as part of a ballet project.

Xenakis' relationship with dance can be considered, in a certain way, ambiguous. He always admired this artistic medium; however, resistance to work with certain aesthetic tendencies in the art of movement accompanied this admiration. He also saw a hindrance, *per se,* in the physical limits of the human body concerning the realization of more technically avant-garde and abstract practices. This ambiguity of his point of view extended equally to the fact that he had an aversion to figurative ballet, but he praised the traditional dances of the world regardless of whether or not they were figurative.

Even though he rarely composed ballets and had certain reservations about composing with dance (as will be better addressed later), his work caught the attention of numerous choreographers and companies[8]. Thus, most music produced with dance was actually adapted to pieces that had already been composed and not created to be accompanied. These adaptations used a wide range of electroacoustic, instrumental, or vocal works[9] for performances by groups or soloists. This was even

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[6] "Alors, sans être dans les petits papiers, c'est Batigne (ou le groupe mais via Batigne) qui souhaitait recommander une pièce à Xenakis, parce que la première c'était Persephassa 10 ans plus tôt, en 69, et je me souviendrais de cette phrase de Batigne qui lui dit à Xenakis : « bon écoute on aimerait te passer une nouvelle commande », Xenakis : « mais pourquoi ? » il comprenait pas trop. Et Batigne lui aurait dit : « parce que tu peux mieux faire »." (François Papirer, interview by author, 2019).

[7] This was also emphasized by Batigne (1981, p. 175) when he affirmed: "many years before I played my first note of Xenakis, I wrote to him asking for a piece for our group. He immediately replied, 'When I write for you, it will be a fundamental work for percussion.' Much later, in 1969, it was an event with *Persephassa*. And ten years later, in 1979, it was the second event". Originally text: "bien des années avant de jouer ma première note de Xenakis, je lui avais écrit pour lui demander une pièce destinée à notre groupe. Il me répondit tout de suite : « Quand j'écrirai pour vous, ce sera une œuvre fondamentale pour la percussion. » Bien plus tard, en 1969, ce fut un événement avec *Persephassa*. Et dix années plus tard encore en 1979, ce fut le deuxième événement" (Batigne, 1981, p. 175).

[8] In terms of dance, Xenakis represented a driving force for countless new performances. Harley (2014) mentions the typical interest in his approaches to gesture, mass movement, and the displacement of sounds in space as "natural elements" that may have caused dancers to become interested in his music.

[9] Among several other pieces used, generally with the composer's consent, it is possible to mention: *Diamorphoses* (1957), *Orient-Occident* (1960), *Atrées* (1963), *Eonta* (1963), *Nomos alpha* (1966), *Nuits* (1968), *Oresteïa* (1968), *Persephassa*

Xenakis' "gateway" to dance, as in 1968, he received a request for the use of two of his orchestral pieces for new choreography by George Balanchine (1904–1983). As Harley (2014, p. 116) stated, "After being introduced to Xenakis' music, probably through recent recordings, Balanchine created a two-part work on his early orchestral scores, *Metastasis* and *Pithoprakta*. This new piece, which had attracted public and critical attention, was revived the following season." Because these performances were successful, he did not take long to compose his first ballet. Thus, as soon as 1968, he worked on it, composing his first original piece with a choreography called *Kraanerg*.

His original compositions with dance are then *Kraanerg* (1968), *Antikhthon* (1971), and *Pléïades* (1978), written within a timeframe of 10 years. All three pieces are considered technically independent of the dance and could thus be presented without the choreographic parts. The two first works, *Kraanerg* and *Antikhthon*, are temporally close and have aesthetic similarities, being of the same compositional phase[10]. *Pléïades* stands out as his last work created specifically for dance, and it is from a different period of his production and an extremely productive phase. Although limited in quantitative terms, his work for dance can be considered major achievements of his production. *Kraanerg* and *Pléïades* are his largest pieces, lasting respectively 75 and approximately 60 minutes.

## 2.1 Antecedents from *Le Fou du Roi* to *Le Concile Musical*

The creation of *Pléïades* as part of *Le Concile Musical* was the culmination of a series of changes to a spectacle initially intended to be called *Le Fou du Roi ou L'histoire vraie d'Antoine d'Anglarès dit Chicot*. The first document that refers to this project is a complete script[11] by Micheline Dupuy[12]. This document contains a handwritten letter dated January 1, 1977, describing changes in a previous script, general concepts, and the title. This indicates that discussions about the spectacle and the first ideas of it go back to at least 1976.

The script that she produced (Fig. 2.1a) is titled "The king's fool or The true story of Antoine d'Anglarès known as Chicot" (*Le Fou du Roi ou L'histoire vraie d'Antoine d'Anglarès dit Chicot*), and it initially describes a ballet–comedy in four acts and ten tableaux ("*ballet-comédie en quatre*

(1969), *Hibiki Hana Ma* (1969-1970), *Persépolis* (1971), *Psappha* (1975), *Rebonds* (1988), *Okho* (1989).

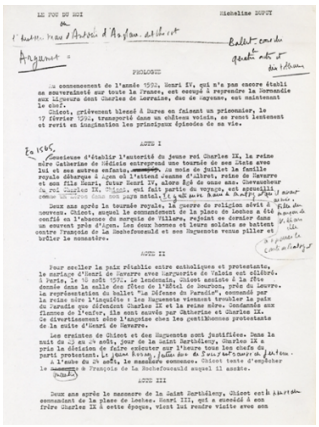
[10] *Kraanerg* was initially composed as a ballet, with Roland Petit (1924–2011) responsible for the choreography and Victor Vasarely (1906–1997) for the staging. More details about this piece can be consulted in Harley (2015). *Antikhthon* was initially commissioned by Balanchine for a new ballet, after the success of his choreography for *Metastasis* and *Pithoprakta*. However, the choreographer would never finish what he initially imagined with Xenakis' music.

[11] Here, this document will be called a "script" because its structure fundamentally emphasizes a drama and texts that should be recited. The material specifically produced by the choreographer for the final spectacle will be called, in contrast, a "dance libretto", because it is much more dedicated to the description of the imaginative elements that guided the choreographic aspects (without any text to be recited).

[12] Micheline Dupuy (1928–2010) is an important French historian and author. She received many literature prizes from the French Academy, and she was elevated to the rank of Knight of the Order of Merit (*Chevalier de l'Ordre du Mérite*). She wrote a book called *Pour Dieu et pour le roi: La Montée de l'intolérance au XVIe siècle* (Dupuy, 1984) that situated the narrative in the same period as the theme she prepared for the script to the *Opéra du Rhin*.

*actes et dix tableaux*"). The story revolves around the memoirs of Chicot[13], a real historical character who was between a jester and a knight. The original script treats Chicot's memories of his life while he is on his deathbed. The script, in addition to various texts to be recited, has many indications referring to incidental music, soundscapes, and sound effects (indications such as "sounds of battle", "clanking weapons", "galloping horses", "shouts", "fireworks", "sails are flapping, and the trumpets are sounding", "The music is fading... Silence", "Festive music", "Pas de deux", "Religious music", and "Tocsin. Music of catastrophe."[14]).

**a)**



**b)**

**c)**


***Figure 2.1***. Documents related to the creation of *Le Concile Musical*. **a)** Script of the first concept tied to *Le fou du roi ou L'histoire vraie d'Antoine d'Anglarès dit Chicot.* Source: © Famille I Xenakis DR (OM 28-17, n.p.). **b)** Xenakis' draft from the first meeting he participated (19.12.1977). Source: © Famille I Xenakis DR (OM 28-17, p. 26). **c)** Flyer of the 1978–1979 season program of the *Opéra du Rhin*. Source: © ONRA.

With these elements clarified (script, characters, historical context), the organizers tried to find someone to compose the music for the spectacle, and Iannis Xenakis was chosen. As was made clear with the project's development, his presence in the development process changed many aspects of this mixture of ballet and theater, which contained precise historical references arranged in a linear narrative, thus demanding programmatic music.

### 2.1.1 The inclusion of Xenakis in *Le Fou du Roi*

The direct involvement of Xenakis in the project seems to have begun only at the end of 1977[15]. Notes, classified as OM 28-17 p. 26 in the *Collection Famille Iannis Xenakis* (Fig. 2.1b), indicate a

[13] Chicot, Antoine d'Anglarès, seems to be the only known jester who led an active political and military life. He was born in Gascone in 1540, and he initially served Honorat II de Savoie as a soldier. He then served under King Henry III and, later, Henry IV as a jester, but equally as a soldier, dying as a consequence of wounds from a fight. He lived under the reigns of Francis I, Henry II, Francis II, Charles IX, Henry III, and Henry IV, a moment in history characterized by constant instability and quarrelling between Catholics and Protestants as a consequence of the reformation. This was essentially the context that the script tried to capture.

[14] As indicated in different excerpts of the original text: "*bruits de bataille*", "*cliquetis d'armes*", "*galop de chevaux*", "*cris*", "*des feux d'artifices*", "*AU LOIN des voiles claquent, des trompettes sonnent*", "*La musique s'estompe... Silence*", "*Musique de fête*", "*Pas de deux*", "*Musique réligieuse*", "*Tocsin. Musique de catastrophe.*"

[15] It is important to underline here that, in the same year Xenakis composed *Jonchaies* (1977) for orchestra. A piece that would present direct connections with *Pléïades* (more details in Chapters 6 and 7).

meeting, or at least a phone call, on December 19, 1977, during which many aspects of the ballet were established (even though substantial changes took place up until the completion of the whole project). Alain Lombard certainly organized this meeting or phone call (as a later document could possibly attest). The general outline remained the same until the first presentation: that of a ballet project that should have premiered at the beginning of 1979, with a commission for Iannis Xenakis placed in contrast with antiphonal music (with each musical part lasting approximately 50 minutes). The antiphonal music would be recorded, Xenakis' music would be played live by the group Les Percussions de Strasbourg, and the score should be available at the end of 1978. How many of those aspects (the inclusion of Les Percussions de Strasbourg, his music being played live, the score being delivered only in late 1978) were requested by the composer or were at the suggestion of Lombard is unclear, but what is certain is that from the moment that Xenakis entered the project, substantial parts of the original ideas were modified. As a consequence of the many exchanges that occurred in the communication triangle between those responsible for the different sectors of the project (*Opéra du Rhin*, Iannis Xenakis, and the musicians of Les Percussions de Strasbourg), the alteration of many aspects occurred.

The first invitation extended to Xenakis (December 1977) described the subject as "*Chicot, fou de Henry III et IV*" (Fig. 2.1b), referring to Dupuy's script. The choreographer considered for the project until then was Milko Šparemblek (1928). Robert Hirsch (1925–2017), an actor of Comédie-Française and an important artist in French theater, was also mentioned in Xenakis' notes. This indication may be due to the original conception using a narrator or actor on stage, a consequence of the type of script and the amount of recited text that Dupuy initially prepared. In his 1977 notes, Xenakis asked himself about possible theatrical actions by the percussionists on stage ("theatric actions? by the percussionists?"[16]), something that he completely abandoned afterward. It is mentioned in the same notes that the script or other factors should not impose a strict correlation between the music and the texts (originally: "*Pas d'arguments imposé à la musique*"–Fig. 2.1b). This requirement was something that Xenakis asked for due to the previous existence of Dupuy's script. It is also observable that this was typical of the relationship between him and composition for ballet[17]. As he expressed in an interview:

> Also, in this case [of *Pléïades*], I dedicated the piece to the *Percussions de Strasbourg*. Originally there is the commission of a ballet for the *Ballet du Rhin*. I accepted the proposal

[16] As originally written: "actions théâtrales ? des perc. ?" (Xenakis' note in *Collection Famille Iannis Xenakis*: OM 28-17 p. 26).

[17] The same occurred with the composition for *Antikhthon* (1971) because Balanchine gave Xenakis total freedom to work. This also happened with *Kraanerg* (1968) and the relationship with French choreographer Roland Petit. As Harley expressed: "What is remarkable is that Petit gave Xenakis a *carte blanche* to compose whatever he wanted while he created his ballet from the recordings as soon as he had them." In the original: "Ce qui est remarquable c'est que Petit laissa carte blanche à Xenakis pour composer ce qu'il voulait tandis que lui créait son ballet à partir des enregistrements dès qu'il les avait en mains." (Harley, 2014, p. 117).

> on the condition that I did not have to deal with the ballet because I wanted to write pure music, fortunately, because the ballet disappeared while *Pléïades* survived.[18] (Restagno, 1988, pp. 48-49).

He also reinforced this aspect in a 1989 interview for Radio France Musique (Xenakis, 1989), in which he stated that he wanted the percussionists to be able to play the piece with or without the ballet[19]. This freedom seemed to be fundamental for any commission of Xenakis, as this was a *sine qua non* condition of his work that he made clear on numerous occasions. Because of this, he demanded contract changes with *Opéra du Rhin* many times, as will now be discussed.

### 2.1.2 Incompatibilities, negotiable terms, and non-negotiable freedom

After the first contact in December 1977, the composer received a letter from the *Opéra du Rhin* on April 21, 1978. It mentioned some points of the first contract that would be delivered soon. Xenakis disagreed with many points in this document, writing his observations and marking his dissent in the letter's margins. The document presented the following conditions:

> In accordance with the discussions with Mr. ALAIN LOMBARD, you are in charge of composing a part of the music of the ballet "LE FOU DU ROI". This music will have to adapt to the conception of the scenario written by Mrs. DUPUY and the choreography; the choreographer remains to be determined. It will be recorded, and a collage will be made, where your music will be associated with music by Gabrieli.[20] (Jean-Philippe Wurtz, mail to Iannis Xenakis, April 21, 1978).

The document also had the purpose of confirming that Xenakis should compose about one hour of music and that "the exact duration [would depend] on its adaptation to the libretto and [would] moreover have to be definitively fixed in agreement with Mr. ALAIN LOMBARD."[21] (Jean-Philippe Wurtz, mail to Iannis Xenakis, April 21, 1978). When reading this, Xenakis immediately marked in the margin of the letter: "there was no question of a libretto. ~~Complete freedom.~~ ~~I am not~~ This is not of my interest. No collage!"[22]

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[18] "Anche in questo caso ho dedicato il pezzo alle Percussions de Strasbourg. All'origine c'è la commissione di un balletto per il *Ballet du Rhin*. Accettai la proposta a condizione di non dovermi occupare del balletto perché volevo scrivere della musica pura. Fortunatamente d'altronde, perché il balletto è fallito mentre Pléiades è sopravvissuto." (Restagno, 1988, pp. 48-49).

[19] The composer specifically mentioned: "[*Pléïades*] was for the *Opéra du Rhin*. My condition was: okay, I'll do this for you, but without thinking of it exclusively for the *Opéra du Rhin*, only if I would have done this composition in an independent way, with or without [the ballet], they could perform it." As originally stated: "[*Pléïades*,] C'était pour l'Opéra du Rhin. Ma condition c'était : d'accord je vous fait ça sans penser qu'à l'Opéra du Rhin, seulement si j'avais fait cette composition d'une manière indépendente, avec ou sans [le ballet] ils pouvaient l'exécuter." (Xenakis, 1989).

[20] "Conformément aux entretiens avec M. ALAIN LOMBARD, vous êtes chargé de composer une partie de la musique du ballet 'LE FOU DU ROI'. Cette musique devra s'adapter à la conception du scenario écrit par Madame DUPUY et de la chorégraphie ; le chorégraphe restant à designer. Elle sera enregistrée et il sera procédé à un collage où votre musique sera associée avec des musiques de Gabrieli." (Jean-Philippe Wurtz, mail to Iannis Xenakis, April 21, 1978).

[21] "la durée exacte est fonction de son adaptation au livret et devra par ailleurs être fixée définitivement en accord avec M. ALAIN LOMBARD." (Jean-Philippe Wurtz, mail to Iannis Xenakis, April 21, 1978).

[22] "il n'avait pas été question d'un livret. ~~Entière liberté.~~ ~~Je ne~~ Ça ne m'interesse pas. Pas de collage!"

Another element of this letter is also interesting, as it mentioned that the work was to be recorded by the Strasbourg Philharmonic Orchestra and that the composer was to "take into account the orchestral composition available to us."[23] (Jean-Philippe Wurtz, mail to Iannis Xenakis, April 21, 1978). Xenakis reiterated this point in handwriting right next to it: "Percussions de Strasbourg not the orchestra" ("Percussions de Strasbourg pas l'orchestre"). This was either a mistake on the part of the representative of the *Opéra du Rhin* (using a standard and usual document for negotiations with composers), or the commission to Xenakis was originally for orchestra (before the first contact with him in December 1977), and he decided to write for percussion sextet[24] (which he also strongly insisted should happen, and that it be performed live).

Xenakis also wrote further details in this letter that he must have clarified during a call or an exchange with Lombard. These details included the date of the first concert (May 3, 1979), the rehearsals (which would be in April 1979), and the people who were still being considered for the project or scheduled for a potential meeting ("Bertrand Duguesclin, Hirsch, Batigne, Lombard, Sparenbleck [sic]"). Seeing that the *Opéra* required a connection between the music and the text of *Le Fou du Roi*, he then asked to have the material produced by Dupuy. Xenakis received the complete script on April 28, 1978, from the *Opéra du Rhin*[25] (Jean-Pierre Brossmann, mail to Iannis Xenakis, April 28, 1978). Upon seeing the script, it seems Xenakis felt that his condition of compositional freedom was not being respected (especially with all the exact indications of the types of music and sound effects located in the middle of the script). This resulted in a series of phone calls and letter exchanges for everything to be explained and settled. His complete independence from the original text was so important that he contemplated a possible departure from the project. In a letter dated June 20, 1978, Lombard stated:

> Following our telephone conversation, I confirm that the OPÉRA DU RHIN asks you to write a work of music for the PERCUSSIONS DE STRASBOURG.
> This work must be divided into four parts. To your music, a choreographer, in agreement with Madame DUPUY, will set a ballet.[26] (Alain Lombard, mail to Iannis Xenakis, June 20, 1978).

[23] " L'œuvre étant enregistrée par l'Orchestre Philarmonique de Strasbourg, nous souhaitons que l'instrumentation tienne compte de la composition d'orchestre dont nous disposons." (Jean-Philippe Wurtz, mail to Iannis Xenakis, April 21, 1978).

[24] It should be also considered that Gabrieli's music was actually recorded by the brass ensemble of the Strasbourg Philharmonic Orchestra for diffusion during the spectacle. Afterwards, the musicians of the Percussions de Strasbourg were also part of the Orchestre de Radio Strasbourg and the Orchestre Municipal de Strasbourg (which became the Orchestre Philarmonique de Strasbourg in 1972).

[25] The following was written in the letter that accompanied the script: "Following your telephone conversation of today with Mr. LOMBARD, I am sending you herewith the project for '*Le Fou du Roi*', which of course will have to be reviewed between you, the writer, and the choreographer." Original text: "Comme suite à votre entretien téléphonique de ce jour avec Monsieur LOMBARD, je vous fais parvenir ci-joint le projet pour 'Le Fou du Roi' qui bien entendu devra être revue entre vous, l'écrivain et le chorégraphe." (Jean-Pierre Brossmann, mail to Iannis Xenakis, April 28, 1978).

[26] "Suite à notre conversation téléphonique, je vous confirme que l'OPÉRA DU RHIN vous demande d'écrire une œuvre de musique pour les PERCUSSIONS DE STRASBOURG.
Cet ouvrage devra être divisé en 4 parties. Sur votre musique, un chorégraphe, en accord avec Madame DUPUY, règlera

This paragraph shows how Xenakis succeeded in demanding some modifications and changed his role in the ballet, as his music was no longer dependent on the script, but, on the contrary, the choreography became dependent on his music. Dupuy's ideas remained in the plans for the spectacle, but the panorama changed drastically to incorporate Xenakis' work as the initial material.

From then on, the discussions with the *Opéra du Rhin* revolved around the contract, and several documents were modified to meet the composer's expectations. Letters exchanges demonstrate that at least four contracts were produced (the first letter about the contract is dated April 21, 1978, and the last one is dated November 6, 1978). The only contract found in the *Collection Famille Iannis Xenakis* is from an exchange that took place on August 25, 1978, but it also has handwritten corrections by the composer that must have required the production of a new document. It is on this document that the name that Xenakis would give to his piece appears for the first time. While the original text read, "THE ARTIST undertakes to compose the musical part of the ballet LE FOU DU ROI"[27] (Opéra du Rhin, 1978, p. 1), he added by hand, "THE ARTIST undertakes to compose ~~the~~ *one* musical part *named PLÉIADES as an independent work in its own right, which will be incorporated into* ~~of~~ the ballet LE FOU DU ROI."[28] This document stipulated that the score should reach the *Opéra du Rhin* on January 2, 1979, and reaffirmed that the work would be presented during the 1978/1979 season, "in principle, between May 3, 1979, and May 27, 1979" (exactly what would happen). With only a few corrections from Xenakis, it seemed that this document would be the penultimate revision of the contract.

Jean Batigne, artistic director of the Percussions de Strasbourg, referred to the worries that may have previously occurred in a letter to Xenakis that was dated September 9, 1978:

> When I returned from vacation, I found in my mail a copy of the letter you had sent to the *Opéra du Rhin*, and I understood that difficulties or confusions arose concerning our musical project. I immediately "jumped" on Lombard, who told me to reassure myself very quickly, there would have been some confusion on the part of the administration, and he immediately sent you back a contract answering your wishes. I am, therefore, fully reassured about this project which is so dear to the hearts of the six of us.[29] (Jean Batigne, mail to Iannis Xenakis, September 9, 1978).

un ballet." (Alain Lombard, mail to Iannis Xenakis, June 20, 1978).

[27] "L'ARTISTE s'engage à composer la partie musicale du ballet LE FOU DU ROI." (Opéra du Rhin, 1978, p. 1).

[28] The dashed words are corrections that Xenakis made, and the words in italics are the text that he demanded to be added to the contract. As originally presented: "L'ARTISTE s'engage à composer ~~la~~ *une* partie musicale *nommée PLÉIADES formant une œuvre en soi indépendante et qui sera incorporée au* ~~du~~ ballet LE FOU DU ROI." (Opéra du Rhin, 1978, p. 1).

[29] "À mon retour de vacances j'ai trouvé dans mon courrier copie de la lettre que tu avais envoyé à L'Opéra du Rhin, et j'ai cru comprendre que surgissaient des difficultés ou des confusions sur notre projet musical. J'ai aussitôt 'sauté' sur Lombard qui m'a dit de me rassurer très vite, il n'y aurait eu une confusion de la part de l'administration et il t'a fait retourner illico presto un contrat répondant à tes vœux. Je suis donc rassuré pleinement quant à ce projet qui tient tellement au cœur des six du groupe." (Jean Batigne, mail to Iannis Xenakis, September 9, 1978).

Was the *Opéra du Rhin*'s administration error, which Lombard mentioned to Batigne, linked to confusion about whether this was a commission for orchestra or a percussion group? Could the possible exit of Xenakis from the project be linked to questions tied to Dupuy's text and its staging? Was this a new problem that appeared as a consequence of the contract's revision? For the moment, some answers could be inferred but the whole context is not completely clear.

### 2.1.3 The period of composition of *Pléïades*

Xenakis had not yet finished the work by the end of 1978. The *Pléïades* composition had started between the previous exchanges—probably during the period in which the main contract discussions took place and after his main demands were assured. The precise dates of the first documents are not available, but some indication that he had begun to develop the piece starting in at least September 1978; in any case, it is sure that he finished the entire transcription on December 27, 1978.

He initially combined generic ideas and produced some small schematic plans for the concepts (tied to textures, rhythmic material, pitch collections based on the Sieve Theory, and some calculations of melodic variations) in some provisory sketches (unfortunately without a date– *Collection Famille Iannis Xenakis* documents OM 28-17, pp. 1 and 22-25). The first dated sketch (document OM 28-17, p. 15), which was presented on millimeter paper and contained more detailed information, was from September 28, 1978, (a date that succeeded all of the problems that almost caused the cancellation of his participation in the project). It presented the generic divisions and names of five movements (which later changed to four) and the systematization of the instrumental range (with instruments Xenakis did not use in the end). It is in this material that the first ideas about the Sixxen started to appear. On October 11, he worked on «*Peaux*», and because the other movements do not have precise dates, it is hard to situate them in time, but it seems that the composition of «*Claviers*» followed the previous one. The next document in which the date of realization was evident was when he calculated the details of the transcription of the material from millimeter paper to traditional staves (document OM 28-17, p. 27). In his personal archives, a transparent paper produced on November 8, 1978, shows that he calculated the number and size of the staves and the number of measures and pages necessary to finish the complete score of *Pléïades*. This document indicates the final date by which to accomplish everything: the end of December ("*Fin déc*."). Effectively, this was the period during which he completed the final manuscript, indicating December 27, 1978.

With the score finished on this date, it was possible to address the construction of a Sixxen from January to mid-April (which would include testing metallic materials and profiles). However, the percussionists needed to send the recorded material to the choreographer, which, as previously determined, should have happened by early March (leaving only two months to complete the

construction of the first Sixxen and the recording of the new piece), something that was ideally planned but did not occur in reality. As stated by the choreographer Germinal Casado, the recording became available to him only three weeks before the premiere. The intermediary period between finishing the composition and the premiere was extremely short, with many details yet to be determined. An intense exchange among the composer, musicians, and instrument constructor may have occurred[30].

### 2.1.4 Changing to *Le Concile Musical*: a new cosmos for *Pléïades*

Modifications of many aspects of the spectacle would continue between November 6, 1978 (a letter with this date mentions the last contract that Xenakis received indicating some details about the spectacle) and the premiere on April 1979. Those modifications were not superficial but essential and profoundly structural, crucial to the premiere and causing some tensions among the artists. In this perspective, the initial idea of the ballet as a comic proposition—it was called, notably, a "*ballet-comédie*" (as visible in Fig. 2.1c)—changed in favor of a more serious and classical approach towards the end. The title *Le Fou du Roi ou L'histoire vraie d'Antoine d'Anglarès dit Chicot* was substituted by *Le Concile Musical*. The initially conceived subject—the actual passage about Chicot and the persons from the 16th century with the dialogs between them—was abandoned entirely. This was substituted for passages without dialog between the artists about the Sacking of Rome (1527) by the Constable of Bourbon, Charles III's army (1490–1527). The dancers embodied some of the personages in these independent tableaux, but not necessarily historical ones. Historical ones were represented in a more symbolic and general way (a pope, cardinals, lovers, or even time and death, among others). The script by Micheline Dupuy was substituted with texts from Louise Labé, Pierre de Ronsard, and Joachim Du Bellay (some writers of the French Pléiades in 16th-century literature). These texts had a much more poetic function; they tried to capture an atmosphere and to provide stimulation for how the main subject of the choreography could be imagined, thus inspiring the dancers in some way. Those changes occurred because the final choreographer, Germinal Casado (1934–2016), asked for them. As he affirmed:

> [I had some] concerns about the proposed idea of a certain libretto that was not very adaptable (so to speak) to the music that was to make up the spectacle, and that alone was already a challenge to overcome, given the differences in their sound color and the time of their composition...
> So, after some reflection, I asked for the possibility of setting up the spectacle, starting from the music, and writing the libretto only according to how it would inspire me. Thus, was born *Le Concile Musical*. The word council, in this case, means "meetings, exchanges of ideas" between two eras and two musical universes at the same time, so distant and so close.[31]

[30] The short time for the construction of the first Sixxen will also be addressed in Chapter 9–Section 9.1.1, and more specific questions about the score will be discussed in Chapter 3–Subchapter 3.2.
[31] "[J'ai eu une certaine] inquiétude quant à l'idée proposée d'un certain livret assez peu conciliable (c'est le cas de le dire) avec les musiques qui devaient former le spectacle, et qui à elles seules étaient déjà un écueil à surmonter, vu la

(Casado, 1981, pp. 275-276).

It is thus perceptible that the changes in the choreographer also occurred. In 1977 and 1978, Milko Šparemblek (1928) was mentioned, but then Casado assumed the role of choreographer at the beginning of 1979[32] while also taking charge of the artistic direction, dance libretto, costumes, and scenography of the creation. Both choreographers were part of the professional circle of Maurice Béjart (1927–2007), and this fact could explain the aesthetic and artistic choices of the *Opéra du Rhin*. Casado was invited later in the course of the project and had very little time to decide how to proceed and work on all of the aspects of the ballet under his responsibility. He affirmed in a handwritten document from a conference he gave in 1983 (CND document–GOUR 3081) that, once he entered the project, the entire spectacle was put together in five weeks and that he worked by studying the scores and listening to the recordings for three weeks before the premiere[33]. This could indicate that the invitation was extended to him at the end of February or the beginning of March, followed by a very intense April[34].

## 2.2 The first performances of *Pléïades* in 1979

While initially created as a ballet piece, Xenakis wanted *Pléïades* to be a piece that could be performed in two independent contexts (with dance and as an instrumental piece). Fleuret (1988, p. 171) reinforced some characteristics that could be adapted to both conditions, stating that *Pléïades* was "not expressly written for the ballet, but not even for a concert circumstance"[35]. Even Les Percussions de Strasbourg did not use the same Sixxen in both presentations, showing that it is important to consider the development of the two different versions as specific moments in understanding the history of the Xenakian instrument.

différence de leur couleur sonore et l'époque de leur composition...
Aussi après quelque réflexion demandai-je la possibilité de monter le spectacle en partant des musiques, et d'en écrire le livret seulement d'après ce qu'elles m'inspireraient. Ainsi prit naissance *Le Concile musical*. Le mot concile, en l'occurrence, signifie « rencontres, échanges d'idées » entre deux époques et deux univers musicaux à la fois si lointains et si proches." (Casado, 1981, pp. 275-276).

[32] He affirmed that his participation in *Le Concile Musicale* was due to a direct invitation made by Alain Lombard (Casado, 2007, p. 180).

[33] This is also confirmed in many of his publications. "Alain Lombard, then director of the *Opéra du Rhin* in Strasbourg, sent me the recording of the *Concile Musicale* only three weeks before the scheduled premiere date. Producing the spectacle with two difficult pieces of music by two composers of great similarity was a real achievement!". As originally stated: "Alain Lombard, alors directeur à l'Opéra du Rhin à Strasbourg, me fit parvenir l'enregistrement du Concile Musical seulement trois semaines avant la date prévue de la première. Réaliser le spectacle avec deux musiques ardues de deux compositeurs d'une grande similitude fut un réel exploit !" (Casado, 2017, pp. 192-193).

[34] "According to the newspapers of the time in which Xenakis would be in Mulhouse to hear the rehearsals starting in 20 April, 1979" (Walther, 1979).

[35] "Occorre infine riservare un posto a parte per una terza opera, non scritta espressamente per il balletto, ma neppure per la sede concertistica." (Fleuret, 1988, p. 171).

### *2.2.1* The ballet version(s)

Upon consulting different authors, one can see that there are contradictions regarding the date and location of the premiere of the spectacle. Gourreau (1979) and Lacroix (2001) stated that the first performance took place on May 3, 1979, in Mulhouse, while Fleuret (1988, p. 172) claimed that "*Le Concile Musical*, presented on May 18, 1979, at the Strasbourg Opera, would no longer be reprised after the first series of performances planned"[36]. From the archives of the *Opéra du Rhin* (ONR) and *Centre National de la Danse* (CND), one can see that the dates of the first series of performances began on May 3, 1979, in Mulhouse and continued until May 27, 1979, with a total of 15 performances distributed among the cities of Mulhouse, Strasbourg, and Colmar[37]. Fleuret (1988) only mentioned one date, and he was wrong about the resumption of the ballet, as it was presented again on two other occasions—in France in 1983 and Italy in 1984—as will be explained in more detail later. Harley (2014, p. 121), who mentioned a "mystery of the original *Pléïades* commission" (it is not clear what he is addressing in these terms), also expressed some misunderstandings about it when he stated that, "Details about the first performance are murky, but it appears that the performance took place at the *Opéra du Rhin*, home of the ballet company, but without the choreographer or dancers determined."[38]

The choreographer was Germinal Casado, and the dancers were those of the *corps stable* of *Ballet du Rhin*; during *Le Concile Musical,* the soloists for *Pléïades* were: Sabine Sallé, Tania Delcros, Karen-Ann Oram, Didier Merle, Bernard Horry, and Jean-Paul Gravier. Casado proposed the name of the spectacle as something that emerged for him upon hearing both musical styles. As he stated in the dance libretto and the concert program (Fig. 2.2a):

> *Concile* must be taken here in the sense of a musical encounter in counterpoint of two eras and two musical universes born of an equal rigor in composition, the music for brass instruments of Gabrieli and the music for percussion instruments of Xenakis. Both are the exact reflection of the whole musical form of their time, Gabrielli [sic] for the 16th century, Xenakis for the 20th century.[39] (Casado, 1979b, p. 1).

To mark this "musical encounter in counterpoint", Casado would assign completely different costumes, scenography, and gestures to each period and each type of music. Therefore, for this

[36] "Concile musical, presentato il 18 maggio 1979 all'Opéra di Strasburgo, che non sarebbe più stato ripreso dopo la prima serie di rappresentazioni previste." (Fleuret, 1988, p. 172).
[37] The spectacle took place on May 3, 4, 5, 6, and 8 in Mulhouse, on May 11, 12, 13, 15, 17, 18, 19, and 20 in Strasbourg, and on May 27 in Colmar. For the dates of May 11, 12, and 13 in Strasbourg, the ballet was performed twice on the same day.
[38] "Les détails sur la première représentation sont troubles mais il semble que la performance a eu lieu à l'Opéra du Rhin, lieu de résidence de la compagnie de ballet, mais sans chorégraphe ni danseurs attitrés." (Harley, 2014, p. 121).
[39] "Concile doit être pris ici au sens de rencontre musicale en contrepoint de deux époques et de deux univers musicaux nés d'une égale rigueure dans la composition, la musique pour cuivres de Gabrieli et la musique pour percussions de Xenakis. L'un et l'autre sont le reflet exact de toute la forme musicale de leur époque, Gabrielli [sic] pour le XVIe, Xenakis pour le XXe siècle." (Casado, 1979b, p. 1).

creation, everything would be thought of as coming from this basic duality and presented as a constant dichotomy. As he also mentioned:

> Gabrieli's sound world evokes all the symbolism proper to the Middle Ages and the Renaissance, of the search for a certain absolute through religious and cabalistic imagery. On the other hand, the sound world of Xenakis reaches its absolute through the rigor of the form, which almost reaches the compositions of the Far East in the stripping of their linear form. The confrontation of these two musical universes, one symbolist, the other of an abstract rigor, necessarily generated the birth of a surrealist spectacle.[40] (Casado, 1979b, p. 1).

**a)** **b)**

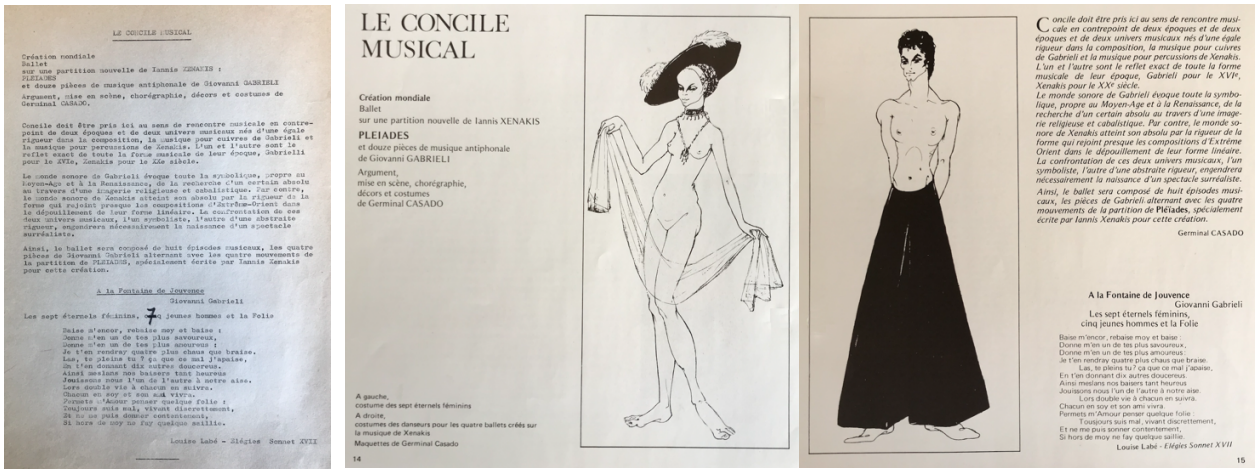


***Figure 2.2***. Documents tied to the premiere of *Le Concile Musical*. **a)** Dance libretto by the choreographer Germinal Casado. **b)** Program notes. Source of both: Fonds Jean-Marie Gourreau (GOUR 1343), © CND.

Two contrasting visual and choreographic universes appeared on stage. On the one hand, there was a more figurative, pompous, and ostentatious representation based on symbolic elements of the Renaissance, with scenes inspired by the literature and music of the same period. On the other hand, there was a more abstract, sober, and modest approach based on the music of Xenakis and gestures inspired by dance traditions from all over the world. The clothes and sceneries chosen also reiterated this dichotomy[41] (Fig. 2.3). There was also a difference in the number of dancers for each part; for

[40] "Le monde sonore de Gabrieli évoque toute la symbolique, propre au Moyen-Age et à la Renaissance, de la recherche d'un certain absolu au travers d'une imagerie religieuse et cabalistique. Par contre, le monde sonore de Xenakis atteint son absolu par la rigueur de la forme qui rejoint presque les compositions d'Extrême-Orient dans le dépouillement de leur forme linéaire. La confrontation de ces deux univers musicaux, l'un symboliste, l'autre d'une abstraite rigueur, engendra nécessairement la naissance d'un spectacle surréaliste." (Casado, 1979b, p. 1).

[41] As Casado (2007, p. 179) stated: "The tableaux alternated with the *Pléïades*, dressed in black leather with trouser skirts and bare chests for the boys, in a mirror setting that took up the entire stage. For the sack of Rome, the decor was a painted baroque sky, and an equally baroque red drapery that took up half of the stage with gold-colored fringes and cords." As originally stated: "Les tableaux alternaient avec les Pléiades, vêtus de cuir noir avec jupe-pantalon et torse nu pour les garçons, dans un décor de miroir qui prenait tout le plateau. Pour le sac de Rome, le décor était un ciel baroque peint, et une tout aussi baroque draperie rouge qui prenait un demi-plateau avec des franges et des cordelières couleur or." (Casado, 2007, p. 179).

Gabrieli's music, there was a variable number of dancers (between 5 and 20), while for Xenakis' music, the number was always fixed, with six performers on stage.


***Figure 2.3***. Scenes from the original ballet *Le Concile Musical*. **a)** Scene related to Giovanni Gabrieli's music. **b)** Scene related to Iannis Xenakis' music. Source of both: Fonds Jean-Marie Gourreau (GOUR 3081: CASAG19830617A), © CND.

Even though the creation generally followed the lines of the dance libretto, some changes took place, especially concerning the order of the movements of *Pléïades*. In Table 2-1, one can see that the order of Gabrieli's movements remained unaltered, but Xenakis' order was changed entirely (which would also happen in the presentation of the spectacle in 1983 and 1984).

***Table 2-1***. Sequence of movements comparing the dance libretto's indications and *Le Concile Musical*'s premiere.

| **Dance libretto** | ***Le Concile Musical* 1979** |
|---|---|
| A la Fontaine de Jouvence – G. Gabrieli | A la Fontaine de Jouvence – G. Gabrieli |
| «*Claviers*» – I. Xenakis | «*Mélanges*» – I. Xenakis |
| La Jeunesse, le Temps et la Mort – G. Gabrieli | La Jeunesse, le Temps et la Mort – G. Gabrieli |
| «*Peaux*» – I. Xenakis | «*Claviers*» – I. Xenakis |
| A la recherche du corps et de l'âme – G. Gabrieli | A la recherche du corps et de l'âme – G. Gabrieli |
| «*Métaux*» – I. Xenakis | «*Métaux*» – I. Xenakis |
| Apothéose de la mort – G. Gabrieli | Apothéose de la mort – G. Gabrieli |
| «*Mélanges*» – I. Xenakis | «*Peaux*» – I. Xenakis |

For the choreographer, the differences between the movements of *Pléïades* also inspired some contrasts with the dance. He even assigned subtitles to each movement in the concert programs produced (Casado, 1979a), referring to his choreographic inspirations for each part. For the movement «*Mélanges*», he used the term "*Concile*" (from French, meaning "council" as the main title of the spectacle), which he used in the sense of encounter and reunion. This might be why he initially thought that «*Mélanges*» could be the last movement of the spectacle (dance libretto), though it later moved to the beginning for the premiere (Table 2-1). For «*Claviers*», he gave the subtitle "Dialogue in Eastern-inspired gestures" ("*Dialogue dans une gestuelle d'inspiration orientale*"); for

«*Métaux*», he provided the term "*Colloque*" (colloquium); for «*Peaux*», he used the subtitle "Simultaneous monologues in African-inspired gestures" ("*Monologues simultanés dans une gestuelle d'inspiration africaine*"). Regarding these differences, he stated:

> The sonic outpouring of «*Métaux*», for example, evoked in me the monastic rigor of a Tibetan temple by the very energy retained. The «*Mélanges*», leading us through various musical paths, gave the opportunity for choreographic leitmotifs to be broken down into short variations. The «*Claviers*» enveloped us in a world of internal rhythms, close to the cultures of the Far East, through subtleties of acoustic interlacing that awakened in us an adequate gesture. The «*Peaux*», on the other hand, was the solar explosion, the physical and rhythmic exultation of the found origins.[42] (Casado, 1981, p. 276).

Concerning «*Métaux*», he also stated that "The period of development was the longest, given the length of the movement and the need for dancers to become accustomed to the sounds of the new instrument used"[43] (Casado, 1981, p. 277). On the opposite side, the composer never mentioned something directly about the choreography, just general commentaries that he worked strictly for the music, not being concerned by the danced aspects. However, in Casado's words, the composer appreciated his work. As the choreographer himself expressed:

> He [Xenakis] was pleased with the choreography conceived for his *Pléïades* composed for Les Percussions de Strasbourg. With great virtuosity, these musicians shone in the passages for skins and metals.
> After the composer's praise for the evening and the appreciable help of my colleague Jean Sarelli, I let out a big sigh of relief because, without a doubt, this was the most difficult performance I had to arrange. I was very happy to have choreographed the world premiere of an important work by this great composer who showed me his sympathy.[44] (Casado, 2017, p. 193).

In this context, Xenakis' only acoustic instrument was presented for the first time. With all the instruments hidden, the audience would have the opportunity to hear them, but not necessarily see them. While the photos of the premiere never show the details of the instrumentation and disposition of the musicians in the orchestra pit, Sixxen characteristics were turned available by the interviews with Gabriel Bouchet and Georges van Gucht. As the construction of Sixxen prototypes began, Kolberg developed one exclusively built for the premiere of *Le Concile Musical* and the first performances of this project (Fig. 2.4a).

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[42] "Le déferlement sonore de «*Métaux*», par exemple, évoquait em moi la rigueur monacale d'un temple tibétain, par l'énergie même retenue. Les «*Mélanges*» nous menant à travers divers chemins musicaux donnaient l'occasion à des leitmotive chorégraphiques de s'égrener en de courtes variations. Les «*Claviers*», eux, nous enveloppaient dans monde de rythmes internes, proche des cultures d'Extrême-Orient et ce, par des subtilités d'entrelacs acoustiques qui éveillaient em nous une gestique adéquate. Les «*Peaux*», en revanche, étaient l'explosion solaire, l'exultation physique et rythmique des origines retrouvées." (Casado, 1981, p. 276).

[43] "la période d'élaboration fut la plus longue, vu la durée du mouvement et la nécessité d'accoutumance des danseurs aux sons du nouvel instrument employé" (Casado, 1981, p. 277).

[44] "Il fut heureux de la chorégraphie conçue sur ses Pléiades composées pour «Les Percussions de Strasbourg». D'une grande virtuosité ces musiciensbrillaient dans les passages pour peaux et métaux.
Après les éloges du compositeur pour la soirée et l'aide appréciable de mon confrère Jean Sarelli, j'émis un grand soupir de soulagement car, sans aucun doute, ce fut le spectacle le plus difficile que j'eus à régler. Je fus très heureux d'avoir chorégraphié en première mondiale une oeuvre importante de ce grand compositeur qui me montra sa sympathie." (Casado, 2017, p. 193).

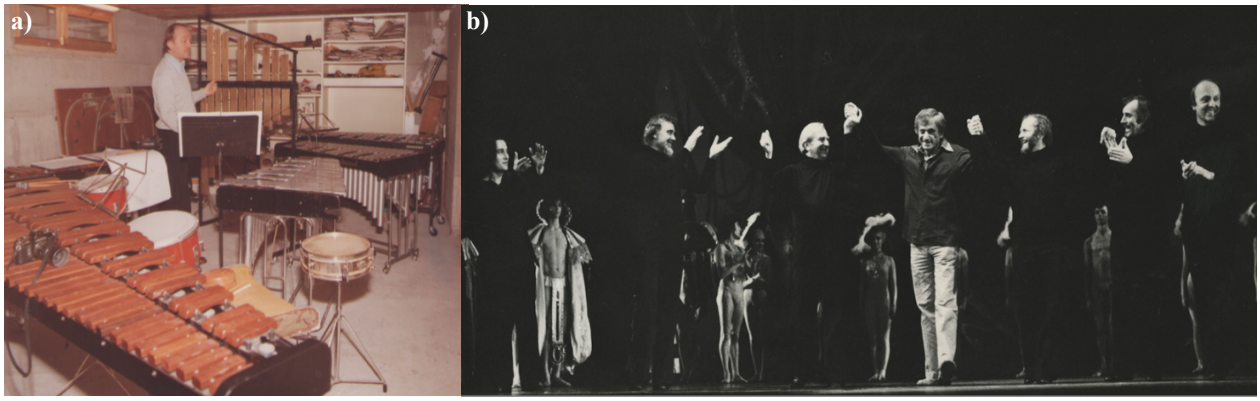



***Figure 2.4***. Images related to the spectacle *Le Concile Musical*. **a)** First prototype of a Sixxen developped by Kolberg and used during the premiere. **b)** The musicians and the composer applauded at the premiere of the spectacle. Source of both: Gabriel Bouchet's personal archives.

As visible above, the bars of this prototype were made of brass and vertically suspended. This positioning was not used again, as it was modified for the instrumental version of *Pléïades,* which premiered the same year. Chapter 9 addresses these specificities in more detail. The musicians that performed at the premiere were Claude Ricou, Gabriel Bouchet, Georges van Gucht, Jean-Paul Finkbeiner, Jean Batigne, and Olivier Dejours (Fig. 2.4b).

#### 2.2.1.1 The subsequent presentations of *Le Concile Musical*

*Le Concile Musical* was supposed to be performed the same year again at the *Festival d'Automne* in Paris, but it was cancelled, as reported by various period journals[45]. What happened in the same year was just a partial presentation of the ballet—exclusively «*Peaux*»— which would turn out to be the only filmed document of the original choreography[46]. The spectacle was presented again as a complete ballet in 1983 in Paris (France) and 1984 in Taormina (Italy). It took place in France on June 17, 18, and 19, 1983, and in Italy on August 17 and 18, 1984 (Fig. 2.5).

[45] "We were supposed to hear this creation in Paris during the Autumn Festival. It seems that the project was curiously abandoned." Original excerpt: "On devait entendre cette création à Paris, dans le cadre du Festival d'automne. Il semble que le projet soit curieusement abandonné." (Segalini, 1979).

[46] This event, tied to the European elections, was called *Soirée de Gala des elections Européennes*, occurred June 10, 1979, and was recorded by the channel France 3 (Flédérick, 1979), being the only video accessible about the original choreography. It is a rare document that is actually accessible only by the archives of the *Institut National de l'Audiovisuel* (INA) with the identifier SXC04006817.

a) b) c)

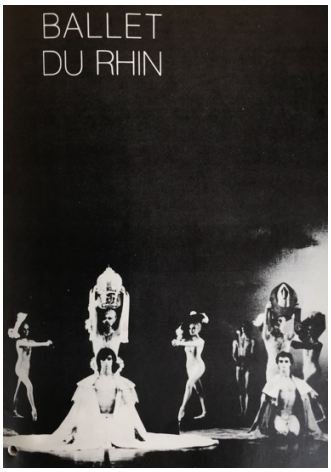





***Figure 2.5***. Documents tied to the presentations of *Le Concile Musical* after the premiere. **a)** and **b)** Program notes to the second complete performance in Paris in 1983. Source: Fonds Jean-Marie Gourreau (GOUR 3081), © CND. **c)** Poster of the Taormina Arte Festival in 1984. Source: Archives of the Taormina Arte Sicilia Fondazione.

It seems that its reception by the Italian audience at the ancient Greek theater of Taormina was "triumphant", as expressed by the journals of the period and visible in photos of the event (Fig. 2.6).

a) b)

***Figure 2.6***. *Le Concile Musical* presented during Taormina Arte Festival in 1984. **a)** Dancers performing a movement of *Pléïades*. **b)** Part of the public present to the performances. Source: Archives of the Taormina Arte Sicilia Fondazione.

Compared with the premiere, some changes occurred in the order of the movements of *Pléïades*, in the performers, and in the used Sixxen prototype. The Table 2-2 shows the order of the movements of *Pléïades* and Gabrieli's pieces. It is noticeable that there was only a change in the order of the movements of *Pléïades*, but there were no changes related to Gabrieli's music. In terms of performers, the dancer Serge Marti-Noguere replaced Bernard Horry[47], and the percussionists Keiko Nakamura and Christian Hamouy replaced Jean Batigne and Olivier Dejours.

[47] The complete group of dancers who performed in this part of *Pléïades* was then formed by: Sabine Sallé, Tania Delcros, Karen-Ann Oram, Jean-Paul Gravier, Serge Marti-Noguere, and Didier Merle.

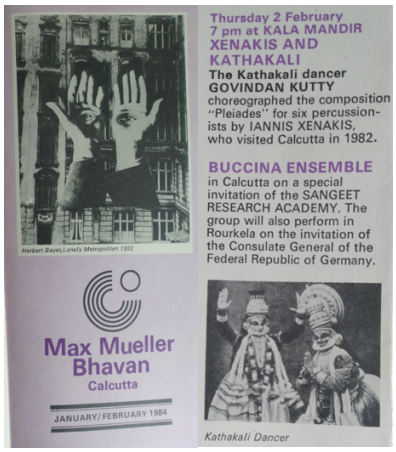
***Table 2-2***. Comparison of the order of the movements in *Le Concile Musical* during the 1979 premiere and subsequent presentations in 1983 and 1984.

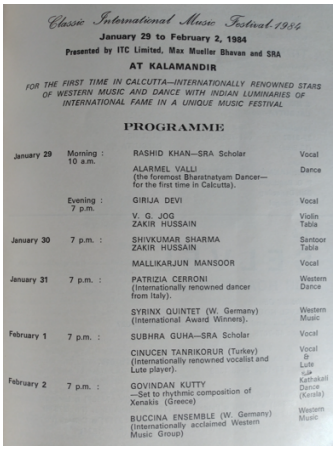
| 1979 (Mulhouse, Colmar, and Strasbourg) | 1983 and 1984 (Paris and Taormina) |
|---|---|
| A la Fontaine de Jouvence – G. Gabrieli | A la Fontaine de Jouvence – G. Gabrieli |
| «*Mélanges*» – I. Xenakis | «*Métaux*» – I. Xenakis |
| La Jeunesse, le Temps et la Mort – G. Gabrieli | La Jeunesse, le Temps et la Mort – G. Gabrieli |
| «*Claviers*» – I. Xenakis | «*Mélanges*» – I. Xenakis |
| A la recherche du corps et de l'âme – G. Gabrieli | A la recherche du corps et de l'âme – G. Gabrieli |
| «*Métaux*» – I. Xenakis | «*Claviers*» – I. Xenakis |
| Apothéose de la mort – G. Gabrieli | Apothéose de la mort – G. Gabrieli |
| «*Peaux*» – I. Xenakis | «*Peaux*» – I. Xenakis |

The spectacle *Le Concile Musical* was not presented again after these performances. As there are few references about it, the original ballet has fallen into oblivion, with some authors even considering that only the premiere occurred (Fleuret, 1988) or that it was never completely accomplished by a specific corps de ballet or never had a specific choreographer (Harley, 2014). However, other choreographies incorporate *Pléïades*, including some authorized by the composer.

#### 2.2.1.2 New choreographies for *Pléïades*

*Pléïades* inspired many different choreographies; the composer expressly authorized some while others were not. The first example, Hans-Jürgen Nagel from *Max Mueller Bhavan* (a branch of the Goethe Institut in India), asked Xenakis for permission for a new choreography based on *Pléïades* to be made by a "serious modern dance group" from Calcutta (then called Kolkata; letter from August 25, 1983). The composer agreed to this in a letter written on November 8, 1983, and indicated that it would be best to use a recording made by the *Südwestrundfunk* (Baden-Baden) of a performance by Les Percussions de Strasbourg in 1979 (the first German performance of *Pléïades,* as will be addressed in more detail in Chapter 9). After receiving permission, this turned out to be a choreographic version based on *Kathakali* (a traditional "story play" dance style from the south of India) that was presented for the first time on February 2, 1984, in Calcutta (India), as visible in Fig. 2.7. The project was connected to the Indian dance master Govindan Kutty (1940–2021), who choreographed this new version. Later exchanges with Nana Gleason occurred in order to ask Xenakis' permission for the presentation of the *Kathakali* choreography once again in Mumbai (then Bombay, India) in March 1985 and during the *Festival d'Avignon* (France) in June 1985, to which the composer also agreed, asking for a videotape of the performances.

**a)** 


**b)** 

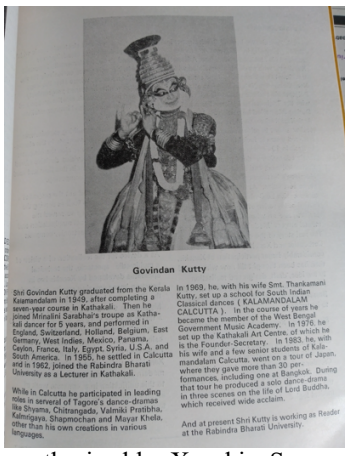
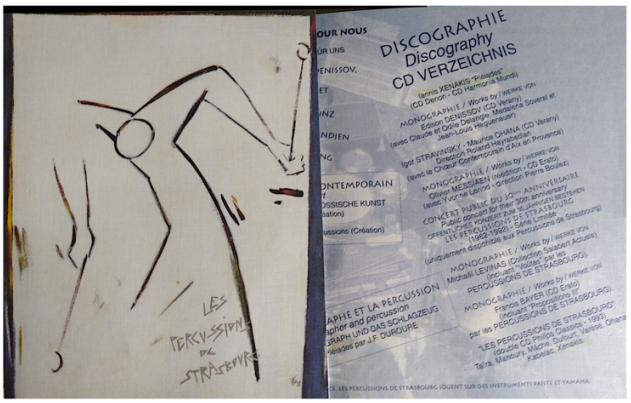

**c)** 


***Figure 2.7***. Program notes of a *Kathakali* performance that included *Pléïades* and was authorized by Xenakis. Source: © Famille I Xenakis DR.

Les Percussions de Strasbourg worked on a project with new choreography by Jean-François Duroure (1964-2021) in the 2000s. There was little information found about this specific spectacle called "The choreographer and percussion" (originally *Le chorégraphe et la Percussion* in French), but some flyers do mention it (Fig. 2.8).

**a)** 

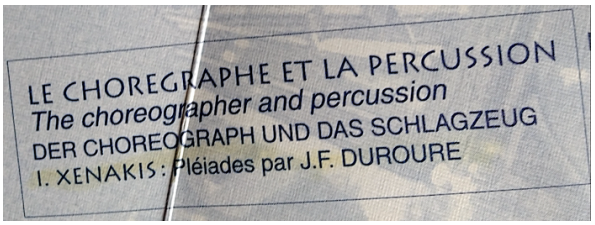

**b)** 


***Figure 2.8***. The second choreography for *Pléïades* created with Les Percussions de Strasbourg by Jean-François Duroure. **a)** Flyer of the diffusion of the season. **b)** Details indicating the specific project called "The choreographer and percussion". Source: © LPSA.

A new ballet version, then the third one with Les Percussions de Strasbourg, started to be developed in 2011, having Alban Richard as the choreographer and the dancers of the Ensemble l'Abrupt. This project connected concerts celebrating Les Percussions de Strasbourg's 50th anniversary. For this choreography, the instruments and musicians were all on stage, interacting with the six dancers (Fig. 2.9). The presence of the musical group on stage created the setting through which the dancers moved and developed the choreographic space.

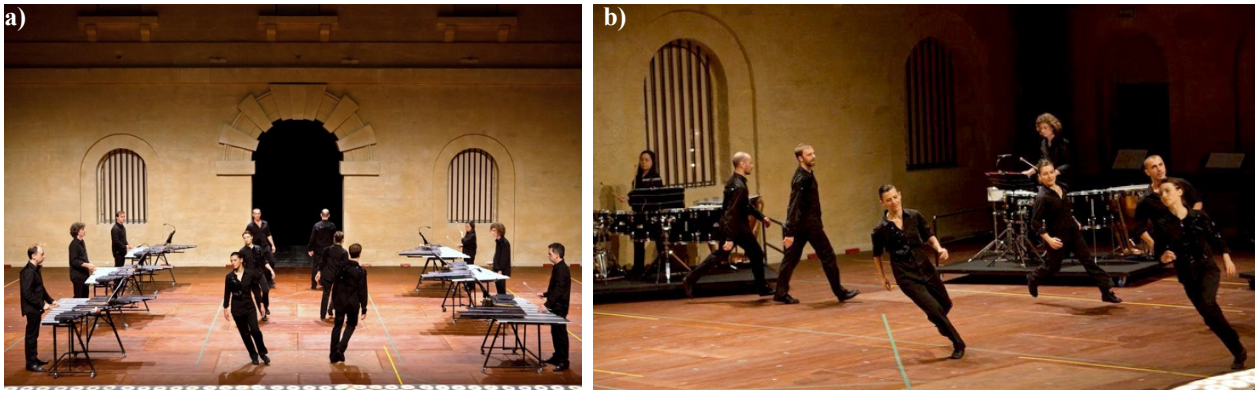


***Figure 2.9***. Photographs depicting the choreography of *Pléïades* created in 2011 by Alban Richard. **a)** Disposition of «*Métaux*» on stage. **b)** Disposition of «*Peaux*» on stage. Source of both: LPSA, © Agathe Poupeney.

This version was well dispersed because of the percussion ensemble's anniversary commemorations and the many performances. A general impression that no previous choreography was created after more than 30 years separating *Le Concile Musical* and Alban Richard's choreography was recurrent during the present research. This created the impression that ballet was left aside on behalf of the instrumental performances made by Les Percussions de Strasbourg. It is true that, even if Xenakis accepted new versions, as addressed here, none of them had a huge impact on the press or tremendous international success. It is perhaps for this reason that, in 1988, Xenakis referred back to the fact that, for him, "the ballet disappeared while *Pléïades* survived" (Restagno, 1988, pp. 48-49)[48]. As Harley (2014, p. 120) stated, "For Xenakis, the relationship between his music and someone else's choreography was a matter of fear and disappointment, and after those initial experiences, he did not seek further opportunities, without however actively discouraging dancers from using his music."[49] This argument is important because, as demonstrated here, he was not actively seeking new choreographies, but he authorized when asked if a new one was possible.

For Fleuret (1988), *Le Concile Musical* did not survive compared to Xenakis' score. Because, in his perspective, its characteristics were not in line with the concept of modernity in place at the time, the spectacle was of little interest after its premiere. For him also, Casado's neo-Bejartian choreography loosely aligned with the "powerful modernity of the new score," the alternation with Gabrieli's music was, in the end, poorly integrated, and it was difficult to find a capable percussion sextet with all of the instruments and materials necessary to play the piece (including, evidently, a Sixxen)[50]. As will be discussed in Chapter 9, such groups existed in the 1980s but rarely worked with ballet, preferring the instrumental version.

[48] Something quite similar occurred with *Kraanerg* (1968). Even though it was generally well received by audiences, the criticisms specific to the choreography were negative, doing that the music "survived" but not the choreography.
[49] "Pour Xenakis, la relation entre sa musique et la chorégraphie de quelqu'un d'autre était sujet de crainte et de déception et, après ces premières expériences, il ne sollicita pas de nouvelles occasions sans pour autant décourager activement les danseurs d'utiliser sa musique." (Harley, 2014, p. 120).
[50] "Si potrebbero trovare diverse spiegazioni per questo fatto: la coreografia neo-bejartiana di Germinai Cassado

It should be noted that the composer had many objections to working in situations where his music was merely an accompaniment to another event, serving as a backdrop, or becoming the subject of something eminently descriptive or figurative[51]. For him, music should have a condition of total independence and a force of cohesion and meaning so powerful that it does not need to be "explained" by anything other than the musical elements themselves. His observations about this started in 1971 with the composition of *Antikhthon*, when he described in the orchestral score that "[Balanchine] left the choice of subject to me; I could write either program music with a plot or music without a story, i.e., abstract music. I chose this latter form, but I gave it a mysterious, evocative title to convey to the choreographer a semblance of an argument that would be more "concrete" than pure musical thoughts." (Xenakis, 1971). After this experience, which unfortunately did not culminate in a finished spectacle, Xenakis' rather critical relationship with dance reappeared in countless statements he made. When asked by Varga in 1989 if the knowledge that dance could be set to his music would influence him, he answered: "No, it doesn't interest me. The only subjects that inspired me were ancient tragedies because they reminded me of my youth and of my attempt to conjure up the music of that period." (Yoken, 1990, p. 104). He also reinforced this sentiment in a 1997 interview; when Serrou (2003, p. 86) asked what he thought about working for dance, he answered: "[As with opera, I'm not interested in dance] either. In fact, I don't want my music to be decorative. You make a lot of money with staged music, but I don't care. I've always done what I wanted to do."[52]

One of his main concerns was that his music would support something figurative or discursive and as an ornamentation of something that was not necessarily abstract, which would be of very little interest to him. From his point of view, his music should not be experienced or judged according to another set of information, especially if this information is not very abstract or dominated by the complex approaches of his works. As Fleuret (1988) added:

> Organized in its logic, the composer cannot admit the visual as a simple a posteriori representation of a preventive idea or substance, as a kind of facilitated translation offered as an attachment to the senses. He, therefore, rejects the superimposed image, gestural commentary, pantomime, decoration, and any artifice of the performance if they are used to seduce, just as he rejects anecdote, quotation, humor, and any form of second-degree expression.[53] (Fleuret, 1988, p. 172).

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pochissimo allineata alla potente modernità della nuova partitura, l'alternarsi alla fin fine scarsamente integrato delle due musiche, e la difficoltà di avere a disposizione in loco il virtuosismo dei sei percussionisti." (Fleuret, 1988, p. 172).

[51] However, as explained before, some exceptions were made for Indian dancers, even though their proposition was essentially figurative. It is not clear why these demands were promptly accepted by the composer, but it seems that an immediate trust in them emerged.

[52] "Pas davantage. En fait je ne veux surtout pas que ma musique soit décorative. On gagne beaucoup d'argent avec la musique de scène, mais je m'en fiche. J'ai toujours fait ce que j'ai voulu." (Serrou, 2003, p. 86).

[53] "Organizzato nella sua logica, il compositore non può ammettere il visivo come semplice rappresentazione a posteriori di un'idea o di una sostanza preventive, come una specie di traduzione facilitata offerta in allegato ai sensi. Rifiuta dunque l'immagine sovrimpressa, il commento gestuale, la pantomima, la decorazione e ogni artificio dello spettacolo se essi sono utilizzati per sedurre, esattamente come d'altronde rifiuta l'aneddoto, la citazione, l'umorismo e ogni forma di

This seemed important to Xenakis because after his third experience composing for dance, he began to seek ballet work later on (with initial drafts dating from early 1988). However, this time he would create his choreography and would even work with non-human performers; automatons that would push the boundaries imposed on dance because of the limited structure and precision of the human body. He would, for the occasion, possibly imply the use of a Sixxen, potentially making this a new piece for his instrument (as will be discussed in more detail in Chapter 4–Subchapter 4.4).

Xenakis composed three works that were initially for ballet, but all ended up being more commonly performed in concert versions, while many of his works initially composed as concert pieces ended up with choreography. For Fleuret (1988, p. 172), this occurred because, even though "it is true that each of Xenakis' abstract creations leads to movement and gesture, it is no less evident that each of his functional works remains sufficiently independent and concentrated to have an autonomous life."[54] For *Pléïades*, this autonomy arrived in the same year as its premiere as a ballet, and it became one of the most important pieces in the percussion repertoire.

### 2.2.2 The instrumental premiere

The instrumental version created during the *Festival de Lille* on November 23, 1979, was performed by the same musicians as those in *Le Concile Musical* (Claude Ricou, Gabriel Bouchet, Georges van Gucht, Jean-Paul Finkbeiner, Jean Batigne, and Olivier Dejours). For the festival, the group proposed a concert with two works that had by then been dedicated to them by Xenakis, premiering an instrumental version of *Pléïades* after performing *Persephassa* (Fig. 2.10).

For the occasion, the group used a new model of the Sixxen. The brass bars were the same as those used in *Le Concile Musical,* but no longer suspended in a vertical position; instead, they were disposed horizontally (Fig. 2.11) and supported on a frame, which gave them an appearance more similar to that of mallet instruments (such as the vibraphone, xylophone, and marimba). With the photos of that period, it is also perceptible that the percussionists used a type of hammer to strike the instruments (see also Chapter 3–Section 3.1.1, and Chapter 10–Section 10.1.7).

espressione di secondo grado." (Fleuret, 1988, p. 172).

[54] "Poiché, se è vero che ogni creazione astratta di Xenakis conduce al movimento ed al gesto, non è meno evidente che ognuna delle sue opere funzionali rimane sufficientemente indipendente e concentrata per avere una vita autonoma." (Fleuret, 1988, p. 172).

**a)** **b)** **c)**

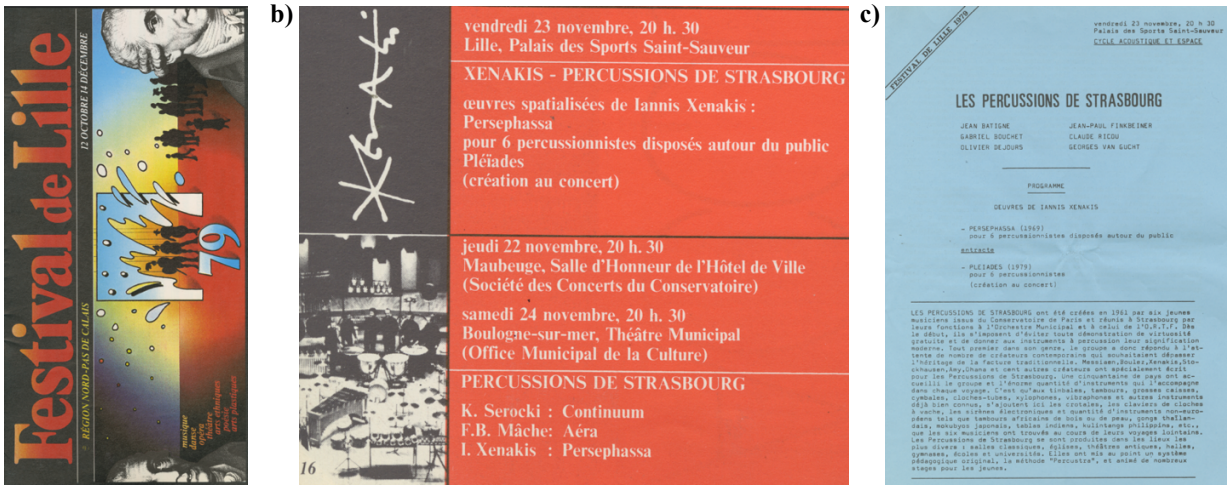


***Figure 2.10***. Documents tied to the first instrumental performance of *Pléïades* at the Lille Festival in 1979. **a)** Coverture of the flyer. **b)** Detail of the flyer showing the concerts by Les Percussions de Strasbourg. **c)** Program notes of the concert. Source: © Famille I Xenakis DR.

***Figure 2.11***. First performance of *Pléïades* during the Lille Festival (France) in 1979. Source: © Famille I Xenakis DR.

It is noticeable that the musicians adopted a circular positioning on stage (Fig. 2.11), organizing the instruments in three concentric rings. The setup and the musicians were surrounded by the audience, as described by a critic at the time: "This ex-ballet, commissioned by the *Opéra du Rhin*, was performed in Lille by the Ensemble de Percussions de Strasbourg, six silhouettes dressed in black in the middle of the audience."[55] (Thorgevsky, 1979). It is perceptible that from the moment the work was proposed in its instrumental version, the musicians started to conceive a central concept of the visuality and spatiality of the performance through the layout on stage.

*Pléïades* then became one of the most important and representative pieces played by Les Percussions de Strasbourg. It is perhaps the piece that was most often played by the group, as Fleuret (1988) stated[56]. Even if the group started to present one or two movements of the piece occasionally

[55] "Cet ex-ballet, commandé par l'Opéra du Rhin, a été interpréte à Lille par l'Ensemble de percussions de Strasbourg, six silhouettes vêtues de noir au milieu du public." (Thorgevsky, 1979).
[56] "Pléiades è per contro divenuta una delle pagine più frequentemente eseguite del catalogo di Xenakis, a partire dalla sua prima esecuzione concertistica, il 23 novembre 1979 al Festival di Lille." (Fleuret, 1988, p. 172).

and not its totality, it was recurrently present as part of their repertoire. The fact that the piece was premiered as a ballet yet rarely reprised in this form and that many percussion groups only presented the instrumental version contributes to its original relationship with dance becoming somewhat forgotten and partially disregarded.

### 2.2.3 First reviews: the perception of Indonesian sonorities

The distance between the premiere and the trip to Indonesia could have erased some connections. However, the reviews and critiques that followed both premieres made a direct association with an imaginary tied to the Southeastern islands of Bali and Java. It is thus noticeable that the press immediately associated *Pléïades* with a perception of Indonesian music. Maybe it occurred by the influence of the texts presented in the choreographer's dance libretto, the program notes of *Le Concile Musical* and *Festival de Lille*, or the sensation that the journalists and critics sincerely experienced. In any case, statements appeared in some dance magazines describing an "extraordinary impression of power and anguish which is born from this council" (Gourreau, 1979, p. 30) residing, among other things, in the opposition of the two musical scores, in which one was constituted "of percussions, inspired by the music of Iran or Bali..."[57] (Gourreau, 1979, p. 30). It was mentioned in another specialized text that Xenakis' universe tried to find the sobriety and severity of Far Eastern rhythms through the gestures of the six dancers[58]. The following description reinforces this: "In front of large mirrors, the dancers dressed in black leather establish a series of dialogues, of oriental and African inspiration, where the dance deals with certain issues of our time with austere sobriety."[59] (Hersin, 1979, p. 20).

This was something not only specific to the specialized press about dance. In the general press, more was found in the *Le Monde* journal that published statements such as "The music surging like a torrent in flood or obstinate like a Balinese ritual calls for other choreographic proposals."[60] (Michel, 1979). Alternatively, as presented in the journal *Le Matin*, "Xenakis responds with echoes that seem to come from far away, from an East still poorly known, almost ambiguous."[61] (Segalini, 1979). Later, at the premiere of the instrumental version, similar comments were made in the journal Le Matin de

[57] "L'extraordinaire impression de puissance et d'angoisse qui naît de ce Concile, 'rencontre en contrepoint de deux univers musicaux' réside non seulement dans l'opposition des deux partitions musicales, l'une de Giovani Gabrieli, compositeur vénitien du XVI$^{me}$ siècle, l'autre concrète, de percussions, inspirée de musiques d'Iran ou de Bali est due à Xenakis mais aussi de l'atmosphère surréaliste engendrée par l'alternance des tableaux." (Gourreau, 1979, p. 30)

[58] "[...] l'universe de Xenakis tente de retrouver, à travers la gestuelle des six danseurs, la sobriété et la sévérité de rythmes extrême-orientaux." (Hersin, 1979, p. 20).

[59] "Devant de grandes glaces, les danseurs vêtus de cuir noir établissent une suite de dialogues, d'inspiration orientale et africaine où la danse traite avec un dépouillement rigoureux certains problèmes de notre temps." (Hersin, 1979, p. 20).

[60] "La musique déferlant comme un torrent en crue ou obstinée comme un rituel balinais appelle d'autres propositions chorégraphiques." (Michel, 1979).

[61] "Xenakis répond avec des échos qui semblent venir de très loin, d'un Orient encore mal connu, presque ambigu." (Segalini, 1979).

Paris: “By composing his own sound scales, by inventing the sixen, a new metallic instrument with nineteen unequal pitches, Xenakis mysteriously echoes an Indonesia metamorphosed by his vision.”[62] (Thorgevsky, 1979).

With the first historical overview described in Chapters 1 and 2, it is now important to address the concepts about the instrument that Xenakis explicitly presented in more detail. As will be evident in the next chapter, the SIX-XEN represents much more in the Xenakian perspectives and approaches than previously mentioned.

[62] “En composant ses propres échelles sonores, en inventant le sixen, un nouvel instrument métallique à dix-neuf hauteurs inégales, Xenakis suscite mystérieusement l’écho d’une Indonésie métamorphosée par sa vision.” (Thorgevsky, 1979).

# Chapter 3. The definition(s) of the SIX-XEN by Xenakis

*Ce sont des fabriquants du son à l'état concret, moi je les fabrique à l'état abstrait...*
Iannis Xenakis (Batigne, 1981, p. 177)

Many composers have served as inventors of new instruments, often reflecting a historical moment, specific aesthetic currents, and socio-political and cultural contexts. Whether directly building the instrument, developing a concept to be realized later, or diffusing a new musical object demanded by a specific repertoire, the interest of composers for instrumental changes is evident in countless possible examples throughout the 20th and 21st centuries[1].

Various aesthetic and compositional tendencies have focused on the musical instrument as a means of changing pre-established sound conventions and musical paradigms. Therefore, Globokar (1980, n.p.) stated that "it is not surprising to hear composers often complain that the inherited acoustic instruments no longer correspond to the realization of their sound vision, and that new ones should therefore be invented."[2] In this sense, how composers perceive and understand an instrument embodies substantial elements to interpret their music. A broader overview of Xenakis' thinking may shed light on new elements to better understand the SIX-XEN in his production, potentially achieve what he eminently desired, and inspire new artistic projects.

The conceptualization and definition of the SIX-XEN will be considered from Xenakis' point of view. This will be described based on the initial ideas written in sketches, the descriptions that accompany *Pléïades* in different versions of the score, and some exchanges presented in later interviews and letters. This chapter will provide a discussion on previous compositional approaches that could indicate how the instrument created by Xenakis is rooted in his compositional thinking and presents profound aspects of his perspectives on music creation and sound production. The different notations that Xenakis produced will also be addressed with focus on the definitive notation's direct ties to the performer's influence.

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[1] In a broader period of history, composers that directly built new instruments include: Hans Neuschel the younger (d Nuremberg, 1533), Paul Hainlein (1626-1686), Theobald Böhm (1974-1881), Adolph Sax (1814-1894), Luigi Russolo (1885-1947), Harry Partch (1901-1974), Walter Smetak (1913-1984), and Volker Staub (1961), among many other examples. Richard Wagner (1813-1883) and the creation of the Wagner tuba in 1853 when he was working on *Das Rheingold* (1854) is an example of an instrument idealized by the composer that was physically developed by another person (in this case, a builder specialized in brass instruments). Composers that disseminated new instruments include Maurice Ravel, who used the luthéal developed by Georges Cloetens in his *Tzigane* (1924) and *L'enfant et les sortilèges* (1919-1925). Another example could be Alexandre Scriabine (1872-1915) who used the tastiera per luce or chromola in *Prometheus: Poem of fire Op. 60* (1910) premiered in 1915 with the instrument designed by lighting engineer Preston S. Millar. And sure, some projects were unfortunately never really accomplished as the instrument that Edgard Varèse (1883-1965) imagined.

[2] "il n'est pas étonnant d'entendre les compositeurs se plaindre souvent que les instruments acoustiques hérités ne correspondent plus à la réalisation de leur vision sonore, qu'il faudrait donc en inventer de nouveaux." (Globokar, 1980, n.p.).

## 3.1 A quest for a new instrument by dots and words

The definition of the SIX-XEN by Xenakis can be perceived as a process in which many different phases occur. Important changes will be elucidated here, putting the composer's considerations into perspective and bringing the description of the instrument in a diachronic perspective to light. The composers' descriptions and definitions will be organized depending on the sources: the manuscripts and sketches, the different versions of *Pléïades* score and the interviews and letters exchanged with the composer after the composition of the piece. This material will consequently present a certain chronological organization from 1978 (year of the first manuscripts) until 1993 (the last document produced by Xenakis mentioning the SIX-XEN in a letter to Philippe Manoury) and thus will show a continuous development in the concepts and ways Xenakis used to describe his acoustic instrument.

### 3.1.1 Manuscripts and sketches

In the *Collection Famille Iannis Xenakis*, three kinds of documents are directly tied to the compositional process of *Pléïades*: the first sketches, the first complete manuscript on millimeter paper (in a mix of graphic and traditional notation) and the design calculation (developed on transparent paper) to the layout of the definitive score. The first sketches (OM 28-17, pp. 1, 9, 15, 16, 22, 23, 24 and 25) point out initial concepts of generic textures and broad perspectives on development of materials (OM 28-17, pp. 24 and 25), as well as specific procedures for «*Claviers*» (OM 28-17, pp. 16, 22 and 23)–tied to the potential sieves to be used and methods to calculate controlled variations of a melodic line–and rhythmic material in general but specifically applied on «*Peaux*» (OM 28-17, p. 1). The first preparatory sketch that indicates the initial ideas about SIX-XEN occupies only a portion of one millimeter page (OM 28-17, p. 15) and is from September 28, 1978 (Fig. 3.1a). On this page, Xenakis determined the subdivision, lengths and names of each movement and a systematization of instruments' ranges (including some instruments not used). It is thus a material he produced to organize and to choose sections and the instrumentation of the piece in a broad way. It is then perceptible that initially five movements were imagined and their names could indicate a different logic of organization of internal materials and structures. Thus, the composer mentioned in this sketch the movements: "α) solistes β) métaux γ) peaux δ) claviers ε) tutti". The movement for soloists was then eliminated and "tutti" was renamed «*Mélanges*». With "β) métaux", the composer also identified a first potential idea about the SIX-XEN, referring to it as "ϛωληνες" (from the Greek word "σωληνες" meaning piping, pipes, or tubes), as indicated in Fig. 3.1b on the top right corner.

**a)** **b)**

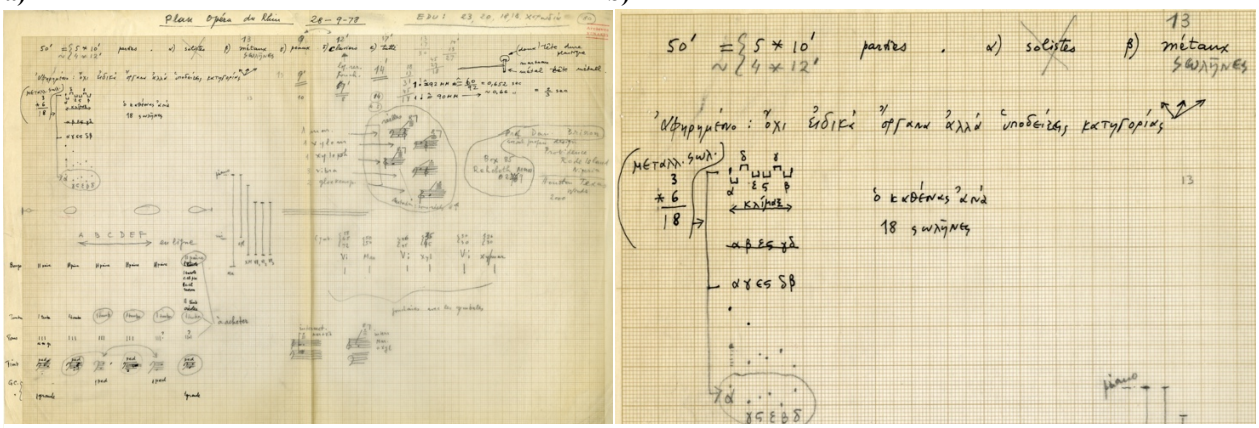

***Figure 3.1***. First concepts on the SIX-XEN in *Pléïades* manuscripts. **a)** General plan produced September 28, 1978 that indicates specifics on instruments to be used in the composition. **b)** Details of the first conceptions about the SIX-XEN. Source: © Famille I Xenakis DR (OM 28-17, p. 15).

This general plan indicates that the composer initially imagined the SIX-XEN with 18 different pitches rather than 19 as seen in the final requirements. The number 18 is the result, as indicated in the document, from the multiplication 3x6, which would explain its numerical origin linked to the number of interpreters for the piece. At this stage, the differences of frequencies between the sixxen of each musician seem to be linked to a type of pitch permutation. To indicate this, Xenakis used a lowercase letter from the Greek alphabet (α, β, γ, δ, ε and ζ) to each pitch (bottom left of the Fig. 3.1b).

It is apparent that the composer is attempting to achieve an instrument with a fixed number of frequencies (18 in total) for all sixxens with each having a unique sequence of those same frequencies. This could explain why one example is indicated with the sequence α, δ, ε, ζ, γ, β, the second α, β, ε, ζ, γ, δ, the third α, γ, ε, ζ, δ, β and the fourth α, γ, ζ, ε, β, δ. With this kind of sets with varied disposition of the eighteen metallic bars in six units (in other words, 18 frequencies reproduced six times, but with a unique disposition of the material for each one of the sixxens), the sound result would be a stable harmonic progression fixed with chords that would vary only in terms of which of the six musicians presents each note in a determined moment. This particular disposition of the bars would allow for an identical melody played by different sixxens to be completely unique to each other but produce a rather stable harmonic structure when presented simultaneously by the entire group. Another clear aspect with this approach is that one sixxen would be a sequence of notes varying the position in the range, presenting a lower note after a high one (or a sequence of higher, lower, middle, higher, lower, higher notes as presented by α, γ, ζ, ε, β and δ at the bottom of the Fig. 3.1b). Each sixxen would not have a layout in which the notes from left to right create a continuous progression from lower to higher pitches in a successive sequence. Instead, it would present a layout in which the lower, middle and higher notes could be differently mixed and would be determined by a permuted sequence rather than a progressive.

Furthermore, this document depicts that from the beginning of the compositional process, Xenakis had a precise vision about the type of mallet that should be used. He envisioned a particular hammer that would have different materials at each end: one side of plastic material allowing for a softer attack and an extremely hard material made of metal on the other (Fig. 3.2a). This double tone mallet was intended to be used throughout «*Métaux*» and to help mainly in «*Mélanges*». This type of mallet was innovative for this period in percussion history and demonstrated that Xenakis was attentive to the smallest details in the search for the sound and type of attack that suited his compositional needs. He emphasized once more the use of the metallic mallet in a specific page of the manuscripts of «*Métaux*» (Fig. 3.2b) indicating "metallic mallets = hammers" ("*baguettes métalliques = marteaux*" in French).

**a)** **b)**

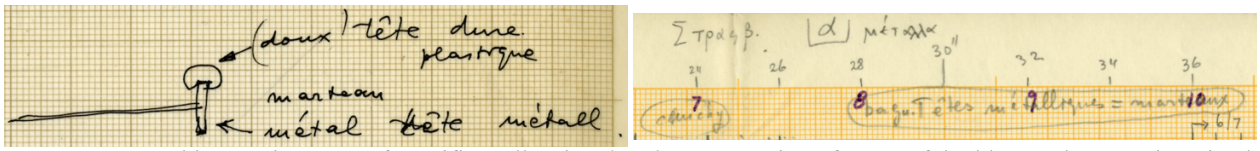


***Figure 3.2***. Xenakis' requirements of specific mallets in *Pléïades*. **a)** Drawing of a sort of double tone hammer imagined by Xenakis. Source: © Famille I Xenakis DR (OM 28-17, p. 15). **b)** Excerpt of «*Métaux*» in which metallic mallets or hammers are indicated. Source: © Famille I Xenakis DR (OM 28-17, p. 2).

After the first sketch, Xenakis modified some aspects during the development of «*Métaux*» in millimeter paper (OM 28-17, p. 2) and it can be noted that the instrument has definitively 19 different sounds (Fig. 3.3). It is maybe because of the first section of the movement that Xenakis changed to the number 19. Imagining that the first sounds should divide the instrument range in two equal parts, he finally chose an odd number of notes and added a 19th bar to each sixxen. This section may also explain the complete change from the permutated sequences that would potentially characterize each sixxen to a final layout of the instrument in which the notes would be a progressive sequence from top to bottom as higher to lower notes. With this change, the beginning of the movement would be characterized by a closer cluster, a sonority that the not-equally tuned metallic materials would originate.

In this millimeter page, the composer theorized how the instrument would be notated during the transcription; this is why he indicated the lower, middle and higher notes of the instrument respectively as D, B and G# ("re", "si", and "sol#" on the top left of the Fig. 3.3a). However, this did not ultimately appear in the end as it was completely modified in the transcription. It is perceptible that the instrument could have been characterized by a very specific configuration of bars if this notation was adopted (Fig. 3.3b), but the composer finished by adopting another initial transcription that will be addressed shortly.

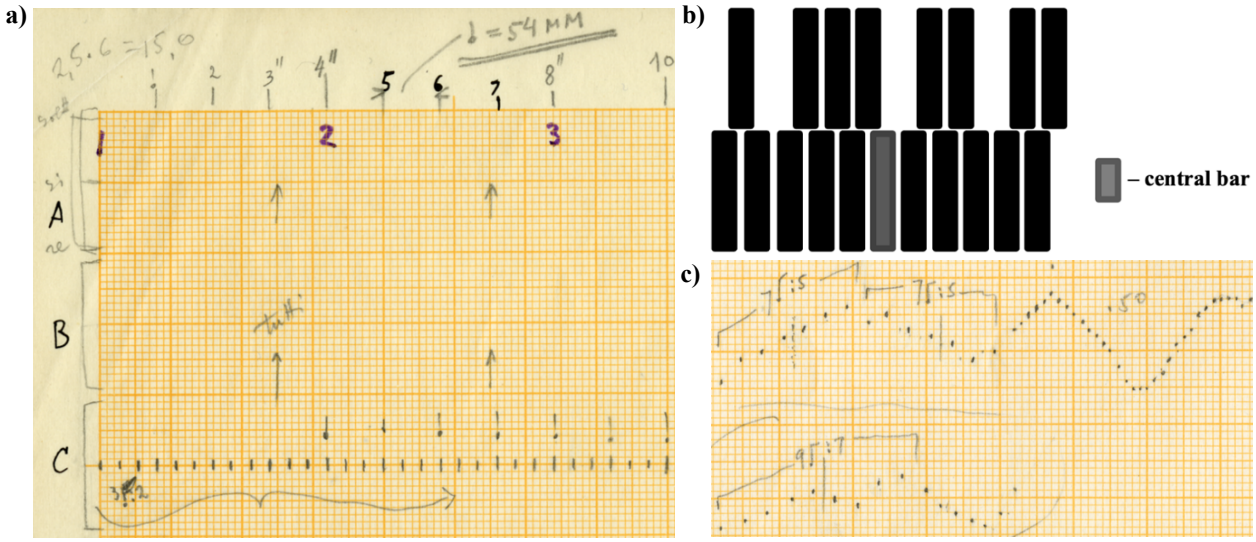


***Figure 3.3***. Initial development of «*Métaux*» showing first elements about the SIX-XEN notation. **a)** Manuscript showing nineteen different sounds and the lower, middle and higher notes respectively as D, B and G#. Source: © Famille I Xenakis DR (OM 28-17, p. 2). **b)** Schematic representation of a disposition of bars considering nineteen sounds from D to G#. **c)** Pointillistic notation for Sixxen, typic of the first manuscript. Source: © Famille I Xenakis DR (OM 28-17, p. 5).

The first complete version of «*Métaux*» is characterized by sequences of dots organized in melodic waveforms (Fig. 3.3c), similar to pointillistic notation. The composer had yet to decide which sound would correspond to each dot and which relation would be established between the notes of his six units. He ultimately gave this final responsibility to the musicians who would be constructing the instrument. Attempting to transcribe the pointillistic first sketches, the composer decided how to produce the specific notation for the SIX-XEN and began to prepare what would be the first score of the piece. Thus, he calculated the length and amount of space that the transcription from the millimeter paper to a traditional grand staff would require (Fig. 3.4).

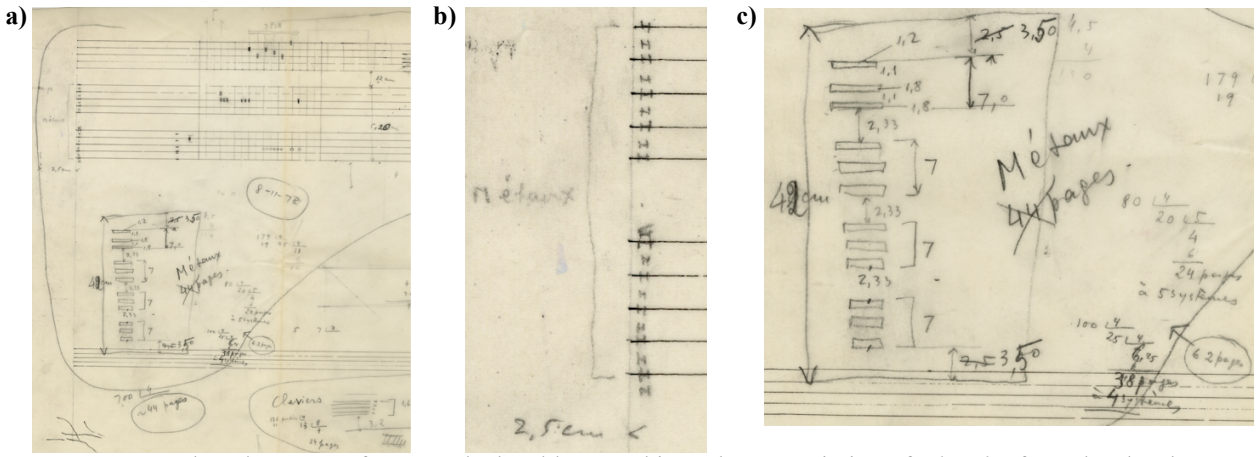


***Figure 3.4***. Length and amount of space calculated by Xenakis to the transcription of *Pléïades* from the sketches to a traditional grand staff. **a)** General view of the left half of the transparent page. **b)** Detail of the specific transcription of one sixxen in two clefs. **c)** Detail of the transcription of the complete Sixxen in two clefs. Source: © Famille I Xenakis DR (OM 28-17, n.p.).

A transparent paper (OM 28-17, n.p.) that indicates the total number of pages needed for *Pléïades* was produced on November 8, 1978 (Fig. 3.4). He also calculated the amount of time to accomplish the task by indicating the end of December for completion. In this specific material, it is clear that Xenakis imagined the first type of notation that would characterize the first version of «*Métaux*» (Fig. 3.4b).

It is also during this period (December 1978 to beginning of January 1979) that Xenakis finished the presentation text about *Pléïades* (Fig. 3.5a) and an explanatory commentary about the instrument that would accompany the movement «*Métaux*» (Fig. 3.5b). Different terms to name his instrument started to emerge: SIXenerg or Sixen (in the handwritten text, Sixen would be then used in the presentation but it would end being published as SIX-XEN). Until this point, the composer called his instrument *métaux*, that means metals in French and the name of the movement. With these elements established, Xenakis began to transcribe all movements, finishing it on December 27, 1978 (Fig. 3.5c) and sending the complete material to the publisher.

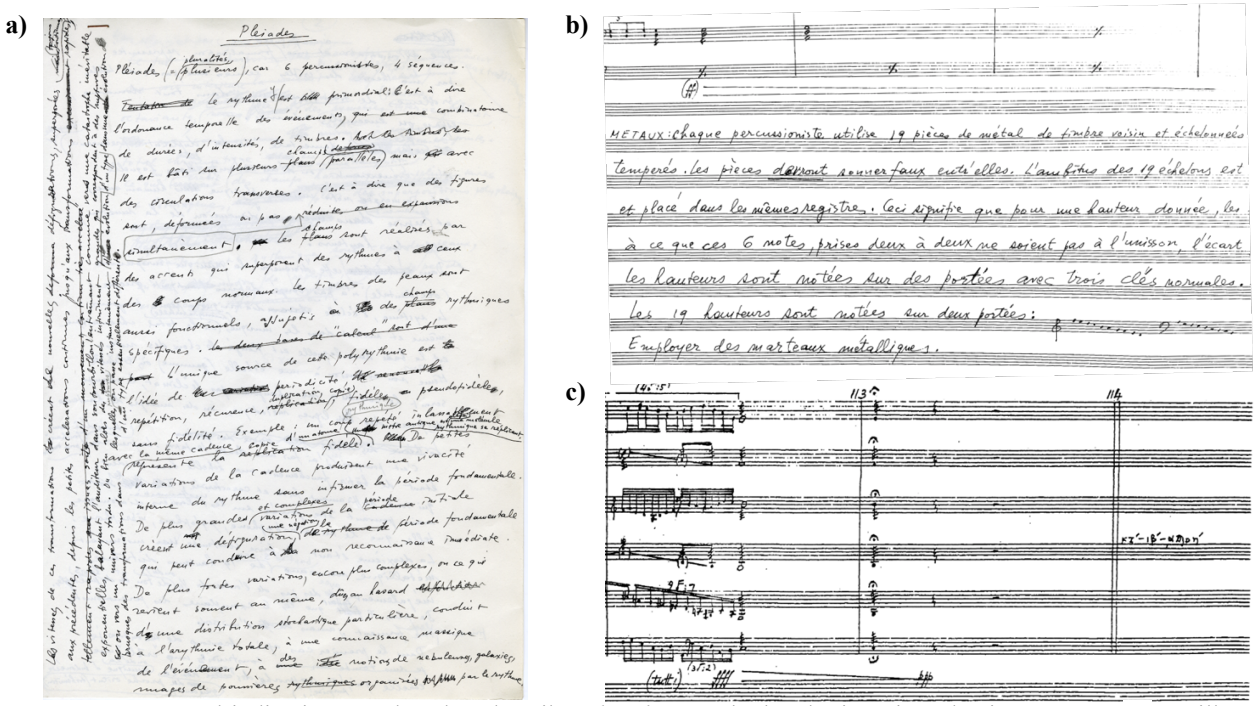


***Figure 3.5.*** Textual indications produced to describe *Pléïades*. **a)** The handwritten introduction. Source: © Famille I Xenakis DR (OM 28-17, n.p.). **b)** Complete description of the SIX-XEN in the end of «*Métaux*». **c)** Date of the final transcription (at the end of «*Mélanges*»). Source: *Pléïades*, meas. 112-113 (Xenakis, 1979) – © Éd. Salabert.

Until the publication of the first version of *Pléïades*, these sources show that Xenakis imagined different possibilities of a new instrument (in terms of number of bars, disposition of bars and the specific notation). The designation also indicated that his mind was constantly changing. From "ϛωληνες" (Greek word meaning piping, pipes, or tubes) to "*métaux*", "SIXenerg" or "Sixen", many

possibilities characterized these initial steps to develop a new concept of instrument and its practical application. As previously highlighted, this was a continuous feedback process between ideas, compositional interests and effective production of materials on sketches of the score. With this initial part described, it remains to be seen what the published versions of the work would allow the musicians to access in terms of definitions of the SIX-XEN, giving them the conditions to perform the task imposed by Xenakis.

### 3.1.2 Scores

*Pléïades* has been published in three versions by Salabert Editions. The first version was the original autograph full score by Xenakis, used by Les Percussions de Strasbourg for the premiere, and officially published in 1979 (indicated thus here as Xenakis, 1979). The second version was presented with new individual scores produced by Salabert with a completely modified SIX-XEN notation (in «*Métaux*» and «*Mélanges*») and published in 1988 (Xenakis, 1988). The third (Xenakis, 2013) was indicated by the editor as a "provisional edition" produced in 2013 and presented a new full score but with the individual parts of the 1988 version. What will be of interest now is to observe how the description of the SIX-XEN changed between one version and another. In the 1979 and 1988 edition, Xenakis stated:

> The second essay was to have a new metallic instrument built, called the SIX-XEN, comprising nineteen irregularly distributed pitches with steps of quarter-tones or thirds of tones or their multiples. In addition, the six copies of the instruments taken as a whole should never produce unisons. As far as the first question is concerned, after long trial I constructed a series (scale) which, surprise!, was similar to the scales of ancient Greece, of the Near East or of Indonesia. However, my scale, unlike these traditional scales, is not based on the octave; it possesses internal symmetries and manages to cover the total chromatic space in three consecutive copies (periods), thus enabling it to create by itself, without any transpositions, supplementary harmonic fields when polyphonic superpositions are made.[3] (Xenakis, 1979, p. i).

Xenakis' statement is synthetic, precise and accurate. When Xenakis introduced the term "SIX-XEN" on the first page of the complete score, he was referring to one unit (one sixxen only), stating that: "comprising nineteen irregularly distributed notes with steps of quarter-tones or thirds of tones or their multiples" (Xenakis, 1979, p. i). However, the composer stated later that it is by the multiplication of this first element consisting of nineteen microtonal frequencies that the desired effect would be produced: "In addition the six copies of the instruments taken as a whole should never

[3] "La deuxième [tentative] étant de faire construire un instrument métallique nouveau baptisé SIX-XEN de 19 hauteurs distribuées inégalement avec des pas de l'ordre du quart ou du tiers de ton et de leurs multiples. De plus, il fallait que les 6 exemplaires des percussionnistes pris ensemble ne forment jamais d'unissons. Dans le premier cas, après beaucoup de tentatives, je construisis un crible (échelle) qui, surprise!, se rapprochait des gammes de la Grèce antique, du Proche Orient, de l'Indonésie. Mais cette échelle contrairement aux traditionnelles, possède des symétries internes, et arrive à couvrir le total chromatique en trois copie (périodes) conjointes, ce qui lui permet de créer à elle seule, sans aucune transposition, des champs harmoniques supplémentaires lors des superpositions polyphoniques." (Xenakis, 1979, p. i).

produce unisons [underline added]" (Xenakis, 1979, p. i). For Xenakis, the SIX-XEN appears to signify an interdependent set composed of six copies not exactly with the same frequencies. Indeed, there is an acoustical effect as a result of the differences between neighboring sounds of the same bar (for example, the first bar of the six units), which shows the clear intention of Xenakis to create a new instrument in a microtonal way, with a very closed cluster in any given note played in unison and a notorious beating effect. In this perspective, it is necessary to create a peculiar object tuned with subtle microtonal differences but which is conceived as a multi-performer instrument. It is clear that a Sixxen is a result of six parts with 19 frequencies each, resulting in 114 frequencies that have to be built. The interactions between those six parts will forcibly produce beating phenomena because of the relatively unadjusted similarity between them.

The Xenakian concept emerged from an idea of sound totality: the characteristics are reached across the entirety of the six parts amalgamated, with each unit having particular and specific features. The composer gave meaning to the totality of the phenomena by the variation of each part. This also reflects the main rhythmic concepts that justifies *Pléïades*[4] (noting that the title itself is explained as "pluralities, various" by the composer) and a specific heterophonic texture that is used in three movements[5]. In the first published score, there is another explanation in greater detail about the SIX-XEN in the final page of «*Métaux*»:

> METAUX: Each percussionist uses 19 pieces of metal from neighbouring timbre and staggered in pitch. The 19 pitches must not form tempered chromatic or diatonic relationships. The pieces must sound false to each other. The range of the 19 steps is arbitrary and will depend on the available pieces; but it will be the same for all six percussionists and placed in the same registers. This means that for a given pitch, the 6 metal pieces will only give approximately the given pitch; it is even recommended that these 6 notes, taken two by two, should not be in unison, the difference can be between +3/4 or -3/4 of a tone of the given pitch.[6] (Xenakis, 1979, p. 16).

This description provided additional "rules" to produce a Sixxen. These are actually the only pieces of information that the Copenhagen Percussion Ensemble, Oberlin Percussion Group, New Music Concerts and perhaps even Warsaw Percussion Group received to build their Sixxen prototype[7]. After the first initial description (in a synthetic two paragraph statement) and receiving

[4] As Xenakis indicated: "The only source of this polyrhythm is the idea of periodicity, repetition, duplication, recurrence, copy, faithful, pseudo-faithful, without fidelity." As originally stated: "L'unique source de cette polyrythmie est l'idée de périodicité, répétition, duplication, récurrence, copie, fidèle, pseudofidèle, sans fidélité." (Xenakis, 1979, p. i).

[5] From the late 1970s through the 1980s, the use of this textural effect was so present in Xenakis' production that Solomos (1996) would name it as "sound halo".

[6] "METAUX : Chaque percussionniste utilise 19 pièces de métal de timbre voisin et échelonnées du point de vue hauteur. Les 19 hauteurs ne devront pas former des rapports chromatiques ou diatoniques tempérés. Les pièces devront sonner faux entr'elles. L'ambitus des 19 échelons est arbitraire et dépendra des pièces disponibles ; mais il sera le même pour les six percussionnistes et placé dans les mêmes registres. Ceci signifie que pour une hauteur donnée, les six pièces de métal devront seulement approximativement la hauteur donnée ; il est même recommandé à ce que ces 6 notes, prises deux à deux ne soient pas à l'unisson, l'écart pouvant être compris entre +3/4 et -3/4 de ton de la hauteur donnée." (Xenakis, 1979, p. 1).

[7] Those are the first groups that played the piece in the beginning of the 1980s and they will be further addressed in

the recordings of different percussion groups, it is likely that the composer changed select ideas and reinforced others characteristics in the first half of the 1980s, including a new addition to the description of the SIX-XEN in the 1988 version. The composer then sent an intermediate description between 1979 and 1988 editions of *Pléïades* to some musicians, as is seen in an exchange with the Dutch percussionist Ruud Wiener in 1982:

> METAUX = Metals = SIXXEN
> SIXXEN is a specially constructed instrument called so from Six (of Strasbourg) and Xen(akis). The included cassette recording was made at the *Südwestfunk*, Baden-Baden, in the fall of 1979. But the SIXXEN is not yet fully satisfying. It is desirable to have constructed a new one. This is its description: Each one of the six percussionists uses 19 metal pieces (could be brass, or steel, etc...), of approximately the same timbre. It is highly desirable that the timbre be a really interesting metallic one. By interesting, I mean, astounding, strange, full, resounding, and without too much reverberation, so that the minute rhythmical patterns be clear for the audience. These 19 metal pieces should be tuned to produce 19 pitches but which should absolutely not form an equally tempered scale. The whole range of the 19 pitches is arbitrary and should depend on the available pieces. However, this range should be nearly the same for all the six percussionists and placed within the same pitch extremes. This means that for a given pitch out of the 19 ones and for any of the six SIXXENS, the other 5 corresponding ones should not form unisons, by no means. The deviation could be slight but should still be noticeable.[8] (Iannis Xenakis, mail to Ruud Wiener, October 29, 1982).

This statement brings two notable elements to light. Firstly, Xenakis sought to integrate the sound of the prototype developed by Kolberg with Les Percussions de Strasbourg and recorded in Germany in 1979[9] as a reference with the score showing something that should be improved. However, his idea did not materialize because although the text was included in the score (still referred to by the publisher as the 1979 version), it did not include the part about the recording. The addition of a recorded reference of a specific Sixxen with the score ultimately never occurred.

Secondly, it is perceptible how the description emphasized many points in timbre and tuning aspects, integrating more specifics about the construction of a Sixxen. It appears that this was a consequence of all the prototypes that Xenakis heard until 1982 (which are at least four different prototypes as discussed in Chapter 9) and also an increasing demand of details about the instrument

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Chapter 9. It was also clearly the first material that Les Percussions de Strasbourg received. However, because Xenakis directly participated in the construction decisions of the first prototype, Les Percussions de Strasbourg received more information through personal exchanges by the presence of the composer.

[8] "METAUX = Metals = SIXXEN
SIXXEN est un instrument spécialement construit, dont le nom est issu de *Six* (percussionnistes de Strasbourg) et *Xenakis*. L'enregistrement sur cassette inclus a été réalisé au Südwestfunk, Baden-Baden, à l'automne 1979. Mais le SIXXEN n'est pas encore pleinement satisfaisant. Il serait souhaitable d'en construire un nouveau. Voici sa description : chacun des six percussionnistes utilise 19 morceaux de métal (d'airain, d'acier, etc...) qui ont approximativement le même timbre. Il est très souhaitable que la qualité métallique de ce timbre soit intéressante. Par intéressante, il faut entendre étonnant, bizarre, plein, résonnant et sans trop de réverbération, afin que toutes les petites formules rythmiques soient claires pour l'audience. Ces 19 morceaux devraient être tempérés pour produire 19 hauteurs, mais qu'ils ne devraient en aucun cas donner une gamme de tempérament égal. L'étendue de l'ensemble des 19 hauteurs est arbitraire et dépendra des morceaux métalliques disponibles. Néanmoins, il faudrait que cette étendue soit quasiment identique pour l'ensemble des six percussionnistes et qu'elle se tienne entre les mêmes hauteurs extrêmes. C'est-à-dire que par rapport à une hauteur donnée parmi les 19 pour n'importe lequel des six SIXXENS, les cinq autres correspondants ne doivent pas former d'unissons. La déviation pourrait être légère, mais néanmoins perceptible." (Iannis Xenakis, mail to Ruud Wiener, October 29, 1982).

[9] The recording that Xenakis mentioned is better explained in Chapter 8–Section 8.1.1.

by percussionists that were trying to create a new prototype. However, even as more details were added, the description continued to be open to interpretation and to accept numerous variations in construction choices, allowing a greater amount of freedom to interpreters in terms of many fundamental characteristics.

The 1988 version included a completely new individual score for «*Métaux*» along with additions in the previous description. These modifications were made producing a chromatic new range that would characterize the notation: "The pitches are noted chromatically:  but have no relation to the actual pitches."[10] (Xenakis, 1988, «*Métaux*», ind., p. 1).

The 2013 "provisional edition" was a new version of the full score with the same individual parts as in 1988 with the chromatic notation. This edition lacked the complete description that had always accompanied the full score through part of it remained in the individual parts. This created a more problematic and complex process for new percussionists to find Xenakis' original concepts and requirements.

In essentially four paragraphs of the *Pléïades* presentation and one paragraph of the «*Métaux*» individual scores, Xenakis gave the description of the instrument he had imagined and further realizations were left to the performers. Most musicians that constructed a Sixxen[11] based their work essentially on one of those descriptions. The countless perspectives and considerations that emerged from the piece, the sound research with development of prototypes and models (including trials and any unaccomplished results) and the specific repertoire created for the SIX-XEN are consequences of just a few sentences written by the composer.

It is clear that Xenakis' description in the scores evolved to be more precise but still lacked details, providing only few structural specifications of how this instrument should be built. Xenakis consciously left a series of elements at the discretion of the constructors, including: the choice of the metallic material to be used, the timbre and final tuning of each bar, the size of the bars and the frame of the instrument, the organization of the bars and the way each bar will be supported by the frame, the presence of a dampening mechanism, the need for attached structures such as resonators or others.

### 3.1.3 Interviews and posterior exchanges

Xenakis made additional comments regarding his instrument in later interviews and exchanges. These comments, produced after the end of the composition of *Pléïades* and some even after many prototypes that he helped to develop, could show some details bringing light on his ideas and approaches. Furthermore, the composer expressed different opinions in many situations regarding the

[10] "Les hauteurs sont notées chromatiquement :  mais n'ont aucun rapport avec les hauteurs réelles." (Xenakis, 1988, «*Métaux*», ind., p. 1).
[11] At least until the publication of texts discussing the instrument, such as, e.g., Reed (2003).

name of the instrument. In the previously mentioned letter to Ruud Wiener in 1982, he mentioned its name as "SIXXEN" (Iannis Xenakis, mail to Ruud Wiener, October 29, 1982). By contrast, in another letter he referenced the instrument's name with the original writing found in the first score. When communicating in 1985 with Claude Ricou (member of the Les Percussions de Strasbourg), Xenakis emphasized that "On the other hand the correct spelling of SIX-XEN is the one you can read on this page."[12] (Iannis Xenakis, mail to Claude Ricou, December 16, 1985). This particular spelling of the name was rarely found in later sources, and remained only in the original score (Xenakis, 1979, p. i) and in the letter to Ricou. The composer himself used SIX-XEN infrequently and on the contrary referenced many other spellings in various sources (such as Sixxen, SIXXEN, sixxen, sixen, Six-Xen, Sixen, SIXenerg, and si-x-en, with the last two used only once[13]), which made the usage of just one term problematic.

In an interview with Restagno (1988, p. 49), Xenakis expressed in March 1988:

> To better realize my goals [composing *Pléïades*] I invented a new instrument that I named Sixen, Six because six were the performers of the Percussions de Strasbourg and Xen from the beginning of my name. It had to be an instrument that, when beaten, would send a different sound than bells and metals in general, and we tried to perfect it through various attempts, because we had managed to obtain an instrument with an interesting sound that swallowed the rhythm. It was Sylvio Gualda who later proposed an inverted U shape in aluminum, capable of making the scans of the beats more clearly perceptible, and now Yamaha in Japan is building an even different specimen.[14]

This comparison and use of term "bell" reappeared in an interview with France Musique, a French radio broadcast, in 1989, when the composer stated about Sixxen that: "They are metal instruments but they must not look like orchestra bells, or any kind of bells, or Bali bells, or anything else. This is very difficult, but finally it is in progress, that is to say that there are constructors little by little who manage to make them."[15] (Xenakis, 1989). The expression "orchestra bells" (*cloches d'orchestre* in the original) may refer to the tubular bells and/or glockenspiel in an attempt to distance

[12] "D'autre part l'orthographe correcte de SIX-XEN est celle que tu peux lire sur cette page." (Iannis Xenakis, mail to Claude Ricou, December 16, 1985).
[13] The term SIXenerg was found in the manuscript that Xenakis produced when primarily working on the text that would constitute the introductory notes of *Pléïades*, something that possibly occurred between December 1978 and January 1979. The term si-x-en appeared in a specific interview given by the composer in April 1979 when he arrived to the rehearsals of *Pléïades* for the premiere of *Le Concile Musical* (Walther, 1979). It is possible that the composer indicated this particular spelling to the journalist.
[14] "Per realizzare meglio i miei scopi ho inventato un nuovo strumento che ho chiamato Sixen, Six perché sei erano gli esecutori delle Percussions de Strasbourg e Xen dall'inizio del mio nome. Doveva essere uno strumento che, percosso, mandasse un suono diverso da quello delle campane e dei metalli in genere, e abbiamo cercato di metterlo a punto attraverso vari tentativi, perché eravamo riusciti a ottenere uno strumento dalla sonorità interessante che però si ingoiava il ritmo. È stato Sylvio Gualda a proporre successivamente una forma di U rovesciata in alluminio, capace di far percepire più nitidamente le scansioni dei battiti, e ora la Yamaha in Giappone sta costruendo un esemplare ancora diverso." (Restagno, 1988, p. 49).
[15] "La pièce [*Pléïades*] est restée dans le répertoire et j'ai même dessiné des instruments spéciaux qui s'appellent les Sixxens. [...] Ce sont des instruments métalliques mais qui ne doivent pas ressembler ni à des cloches d'orchestre, ni à des cloches quelconques, ni de Bali ni quoi que ce soit. Ce qui est très difficile, mais enfin c'est en progrès, c'est à dire qu'il y a des constructeurs petit-à-petit qui arrivent à les faire." (Xenakis, 1989).

its instrument from those with equal tempered tuning. The expression “Bali bells” on the other hand is of interest and could perhaps indicate that the composer was referring to the gongs of Asian traditions or the metallophones from Indonesia. It is possible that he was affirming his non-interest in the superposition of pre-constructed instruments, as this occurred with the Copenhagen Percussion Ensemble in 1980. He was therefore emphasizing the need to construct this instrument in order to have something new with a certain refusal to use any pre-existing or known metallic instrument. Even if he was categorically excluding the instruments from Indonesia to be used (or the gongs, at least), it is necessary to perceive the interconnections that he consciously and unconsciously produced during the piece composition with the traditions from the Southeastern country.

A 1989 interview with Varga (1996, p. 180) may have given the broader SIX-XEN description by Xenakis, beyond all versions of *Pléïades*. The interviewer stated “I understand you’ve invented a new instrument, the Six-Xen, which may have been born out of this desire to enrich the all-too-homogeneous percussion sound.” Then the composer answered:

> It was intended for the six players of Les Percussions de Strasbourg (‘*Xen*’ stands for Xenakis and *‘Six’* for the number of players) and their performance of *Pleiades.* I wanted a sound that would be different from the keyboard instruments, the vibraphone and the marimba, which have more or less classified sonorities - ‘nice’ sounds, let’s say. I wanted something stronger, closer to a metallic sound without using bells or things like that. I described what I had in mind and several attempts have been made to produce it, but so far none has been satisfactory. They simply don’t seem to know how to do it. Of course, it’s difficult to obtain the quality of sound I’m asking for. I told them it was to differ from the so-called percussion instruments, whether hit by hammer or otherwise. (Varga, 1996, p. 180).

Varga then expressed that “It’s also difficult to decide what the shape should be: should it be a flat plate or ought it to have a U-shape?” To which Xenakis answered:

> I tend towards the latter. It shouldn’t produce a tempered scale – the six instruments should have sounds close to nineteen previously fixed notes which act as tone centres. In other words, each of the six players plays a particular note belonging to one of the centres, so that the six notes of one tone centre differ slightly from one another. In this way you create beats and a kind of complex sound around the same note. I would have the nineteen prefixed central pitches spread quite wide apart, and the intervals would be produced with a ‘sieve’ so that they wouldn’t be the same everywhere. In this way you get a kind of aura around a note played by the six percussionists. (Varga, 1996, p. 180).

Varga also questioned if Xenakis had any particular alloy in mind to build the instrument, to which he replied:

> No. I don’t think so. So far brass and aluminum have been experimented with, but I think steel would be better. It has yet to be worked out properly. A great deal of money is needed, of course, so it’s not easy to find people ready to devote their time and energy to the project. Yamaha in Japan was going to be involved but I don’t know how far that has developed. (Varga, 1996, p. 180).

It is perceptible that, even 10 years after the creation of the piece, after all of the experiments that were done with Kolberg, Bergerault, Robert Hébrard and Yamaha[16], after he had heard numerous recordings of more prototypes, Xenakis was still open to new researches, tests and possibilities. He also continued to give generic information about the type of sound of Sixxen that seemed appropriate even in terms of direct qualities about metal and shape, continuously establishing an open instrument. Until the above interview in 1989, he had previously helped to develop four prototypes and had contact with at least five more, showing that diversity of future prototypes, later experiments, sound research and achievements continued to be crucial for him.

In 1993, Philippe Manoury sought funding to construct a new Sixxen or a variation of Sixxen based on Robert Hébrard and Albert Abitbol's 1985 model. This project resulted in many exchanges between Manoury and Xenakis. Manoury affirmed that "we know that [Xenakis] had imagined that [sixxens] could also not be made of metal, but a very hard porcelain."[17] At the time, his statement proved both interesting and controversial. It is interesting because it shows the continuous search for something new and that Xenakis may not have been satisfied with previous Sixxens. It is also controversial because the metallic aspect of the bars was one of the few certainties that Xenakis had included being even one of its fundamental characteristics and the essence of the main timbre qualities (having direct implications with the aspects discussed in Chapter 7). Manoury confirmed this information during an interview to the present author in 2018. He also stated that, in a certain way, Xenakis was constantly changing his beliefs, considerations and specific recommendations in relation to his instrument. Thus, because the suggestion to use porcelain remained only in personal discussions with Manoury during the 1990s, no percussion ensemble developed a project about it and nobody produced such prototype. The description in the score, the recordings and the previous prototypes constructed remained as the main references for the instrument and is the reason for why only models with metallic bars are found as Sixxens until now. This situation also illustrated that the instrument was not completely achieved as a final product for him and that, as he stated numerous times a better version had yet to be created.

Manoury was concerned by the fact that the Sixxen of Les Percussions de Strasbourg was deteriorating and either in need of repair or complete renovation. He began seeking funding for a project to construct a new Sixxen or a variation of the type based on the model used at the time by Les Percussions de Strasbourg (Hébrard-Abitbol model). In June 1993, Xenakis agreed to write a letter for the project, in which he mentioned:

> Philippe Manoury brought to my attention the critical situation in which the sixxens find itself. There seems to be, for the moment, only one really usable set – although it also needs

[16] See more details in Chapter 9.
[17] "On sait qu'il avait imaginé qu'ils soient non pas en métal mais en porcelaine très dure" (Manoury, 2012, s.p.).

> some repairs – and which is in the possession of Les Percussions de Strasbourg[18].
> I think, indeed, that it becomes rather urgent to take care of the construction of one (or even several) sets, because when the one of Les Percussions de Strasbourg poses problems due to transport or ageing, there will be no more possibility to play the pieces written for these instruments.[19] (Iannis Xenakis, mail to Philippe Manoury, June 25, 1993).

Xenakis' engagement with these projects to construct his instrument is evident and is parallel to the fact that diversity could achieve his main objective: a plural instrument. Specifically, a plural instrument in the context of his own polymorphic internal ideas but broadly a plural instrument when comparing achievements of different constructors.

As Xenakis was an experienced engineer and architect, he was able to easily and skillfully design a highly detailed construction project with all specifications that would seem necessary to him. This was clearer after all the experiments that he had done with different companies and the exchanges with different percussion ensembles. Even though he had numerous contacts with engineers and acousticians (through GRM, IRCAM, CEMAMu) he had never detailed all the attributes as a definitive design plan that would determine all aspects of a Sixxen construction of a finished and definitive instrument from a formal and practical point of view. Although it would have been possible to design this through resources and professionals, it was not his intention to do so. As Jean-Paul Bernard, artistic director of Les Percussions de Strasbourg for many years, addressed: "I always had the impression that even if it's a work that has been played for many years, each time it was played Xenakis rediscovered it, in part because of the prototypical instrument."[20] (Barthel-Calvet, 2011b, p. 22). In this overall context about the composer and his instrument, it is still important to understand the relationship that the composer established with different companies and the concepts about construction of musical objects that he had addressed.

### 3.1.4 "Whereas here, percussion instruments, because of industrialization, are ruined"

On multiple occasions, Xenakis spoke of his thoughts on the construction of musical instruments and specifically percussion instruments. The composer also expressed his opinions on the industrial production of musical objects, its characteristics, the standardization of products and sonorities and what should be done in this context. These opinions are of importance and are appropriate to be addressed in the present discussion, his view and perspectives about his own

[18] As it will be discussed on Chapter 9, Kroumata purchased the same model with Hébrard in 1989 but Xenakis was probably not aware.

[19] "Philippe Manoury a attiré mon attention sur la situation critique dans laquelle se trouvent les sixxens. Il semble n'exister, pour l'instant, qu'un seul jeu réellement utilisable – bien qu'il nécessite aussi quelques réparations – et qui est en possession des Percussions de Strasbourg.
Je pense, en effet, qu'il devient assez urgent de s'occuper de la construction d'un (voire de plusieurs) jeux, car lorsque celui des Percussions de Strasbourg posera des problèmes dus au transport ou au vieillissement, il n'y aura plus de possibilité de jouer les pièces écrites pour ces instruments." (Iannis Xenakis, mail to Philippe Manoury, June 25, 1993).

[20] "J'ai toujours eu l'impression que, même si c'était une œuvre jouée depuis des années, à chaque fois, Xenakis redécouvrait son œuvre, en partie à cause de cet instrument-prototype." (Barthel-Calvet, 2011b, p. 22).

acoustic instrument and its construction. This may also bring to light a broader understanding of his relationships with companies such as Kolberg, Rhythmes et Sons, Bergerault, Grimus (Robert Hébrard's company), and Yamaha. Similarly, it may even highlight some specifics of the relationship with artisanal constructors with whom he was familiar and exchanged about the SIX-XEN (such as Ruud Wiener for the Nieuwe Slagwerkgroep Amsterdam and Pietro Bertelli for the Brake Drum Percussion) or whose prototype he had heard (such as with the Copenhagen Percussion Ensemble, Oberlin Percussion Group, NMC and Nexus, Makoto Aruga Percussion Ensemble, and others that will be addressed in Chapter 9). In this perspective, some statements of the composer about the production and development of instruments can be found in interviews and audiovisual recordings throughout his career. In a 1997 interview, for instance, Serrou asked Xenakis what he thought about "instrumental evolution", and he said:

> I think it won't stop, because there will always be young and brave people. So, there will be no stopping evolution. But I don't know in which direction it will go. If I had to start my life again, I would do the same. If my pieces stand the test of time, posterity will choose among the works that are worth saving. I do not regret or praise any of my pieces. When I compose, I do not think about the audience but about what I have to do.[21] (Serrou, 2003, pp. 91-92).

Notice that the statement points to aspects of the evolution of instrumental composition and not only of its construction. For Xenakis, the evolution of instruments was a consequence of the development of the composition and the repertoire for them. These facts were inseparable for him; the responsibility of continuous innovation with respect to instruments was part of writing new music and devising new approaches. The composer's answer evidenced his belief in a continuous process of developing materials—whether they are physical or conceptual—as a notion of the utmost importance in future decisions and practices, being equally necessary the engagement of artists in innovation. This almost optimistic and utopic approach was thus present in this belief in the continuous search for processes and products that enable musical development.

Specifically regarding percussion, in another interview, he further stated explicitly that there should be a direct relationship of percussionists to the production of instruments. This was very clear when he stated to David Yoken in 1986 that:

> The percussionist must engage his entire body in the aspects of sound production. The percussionist must be involved in the invention and manufacturing of new instruments. With artistic integrity, the percussionist should work closely with industry to create these new instruments. Unfortunately, today commercial instrument manufacturers are not interested in this development. (Yoken, 1990, pp. 54-55).

[21] "Je pense qu'il ne se figera pas, parce qu'il se trouvera toujours des hommes jeunes et vaillants. Il n'y aura donc pas d'arrêt de l'évolution. Mais je ne sais pas dans quel sens elle ira. Si je devais recommencer ma vie, j'agirais de même. Si mes pièces résistent au temps, la postérité choisira parmi les œuvres qui valent la peine d'être sauvées. Moi, je ne regrette ni n'encense aucune de mes pièces. Lorsque je compose je ne pense pas au public mais à ce que je dois faire." (Serrou, 2003, pp. 91-92).

Here, he directly mentions the association with "commercial instrument manufacturers" at a moment when he himself had contributed to the development of Sixxens by Les Percussions de Strasbourg with Kolberg, Rhythmes et Sons, Robert Hébrard (Grimus), as well as the prototype by Sylvio Gualda with Bergerault, and he was even working on a new one with Yamaha. Although he attempted to work more "closely with industry" on multiple occasions, not all that he gleaned as a consequence of the industrialization of musical instruments was positive.

During an interview with Delalande in 1981, when referring to instruments as an essential element in the search for new sounds, he stated:

> One has just to look at what Western instruments have ended up with after centuries, probably millennia of research into delicacy, finesse, sound and acoustic efficiency, and, in comparison, to see what happens in the high civilizations of Asian or African musical culture, where the sound itself is something that exists; it is not an imagination: when you play on the skin of the tabla it produces remarkably beautiful sounds. Whereas here, percussion instruments, because of industrialization, are ruined; it's not worth it, it's ugly sound. With the nylon skins, isn't it?! And then the drums more or less plastic or of any shape, any tension, it's really lamentable. Whereas with every instrument of these civilizations that are still alive, that have not been destroyed by television or radio, the sound itself is cultivated. In the conservatories here, you have to have talent to overcome the lack of this culture of sound itself; they teach you to make notes.[22] (Delalande, 1997, p. 62).

According to Xenakis, there are cumulative processes and effects in instrument construction; through thousands of years of research, innovation and improvement, some societies have arrived at "remarkably beautiful sounds". This argument with a quasi-reverence of sonorities and instruments from non-Western cultures is recurrent and perceptible in different interviews, such as in Reichenbach (1969) and Varga (1996). Another aspect highlighted in this specific excerpt returned later when interviewed by Restagno (1988, pp. 46-47), as he stated:

> Going in search of timbre original solutions, I was attracted to the percussion instruments of Asia, which possess a timbral richness unknown in the West. Here, those instruments are mediocre, because they are built industrially and often crudely. We are often content, moreover, to beat on them without paying attention to the fact that each beat should have its own sonorous substance and that the sound is in itself a living thing, as is believed, of course, in Java, India, China or Japan.[23]

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[22] "Il suffit de regarder à quoi ont abouti les instruments occidentaux après des siècles, des millénaires probablement de recherches dans la délicatesse, dans la finesse, dans l'efficacité sonore, acoustique et, en comparaison, de voir ce qui se passe dans les hautes civilisations de culture musicale d'Asie ou d'Afrique où le son en soi est quelque chose qui existe ; ce n'est pas une imagination : lorsqu'on joue sur la peau du tabla il produit des sons remarquablement beaux. Tandis qu'ici, les instruments de percussions, à cause de l'industrialisation, sont foutus ; ce n'est pas la peine, c'est laid comme son. Avec les peaux en nylon, n'est-ce pas, et puis les fûts plus ou moins en plastique ou de n'importe quelle forme, n'importe quelle tension, c'est vraiment lamentable. Tandis qu'avec chaque instrument de ces civilisations qui sont encore vivantes, qui n'ont pas été détruites par la télévision ou la radio, le son en soi est cultivé. Dans les conservatoires, ici, il faut avoir du talent pour dépasser le manque de cette culture du son en soi ; on enseigne à faire des notes." (Delalande, 1997, p. 62).

[23] "Andando in cerca di soluzioni timbricamente originali fui attratto dalle percussioni dell'Asia, che posseggono una ricchezza timbrica sconosciuta in Occidente. Da noi quegli strumenti sono mediocri, perché vengono costruiti industrialmente e spesso in modo grossolano. Spesso ci si accontenta d'altronde di picchiarci sopra senza stare a pensare che ogni colpo dovrebbe avere una sua sostanza sonora e che il suono è in sé stesso una cosa vivente, come si crede, naturalmente, a Giava, in India, in Cina o in Giappone." (Restagno, 1988, pp. 46-47).

There was therefore a certain duality in how Xenakis viewed the musical instrument industry; while on one hand, he saw that it could be important for the development of new instruments with musicians, it could also result in a diminution of the instruments' characteristic qualities. In this sense, a certain continuity in Xenakis' thinking can be noticed in his interviews with Delalande in 1981 (Delalande, 1997) and with Yoken in 1986 (Yoken, 1990). For Xenakis, insofar as industrialized instruments tend to be "really lamentable," (Delalande, 1997, p. 62) musicians who intimately know their practical application must engage in improving their structural and sonic characteristics. The industrial limitations could be surpassed with the contributions of those who regularly interact with, manipulate and need musical objects in other words, the musicians.

Specifically with regard to the industrialization process of the Sixxen, there appears to be another element at stake that adds to previous factors. A relationship with commercial instrument makers for the development of prototypes interested Xenakis, but the desired possibilities for his instrument could not be considered standardized in this way, as the companies could only present a single model that would be, from that moment on, the only possibility for the representation of the composer's idea of the sound (see also the discussion about multiplicity and unfaithful repetitions bellow–Subchapter 3.3.4). He seemed to show a certain concern about the legitimization of a unique industrial prototype and the singularization of a concept of instrument that is open via such a well-known company as Yamaha. What concerned the composer was that from the moment that a single company would start marketing the product, this would become the reference model for a Sixxen, and a unique possibility of his instrumental concept was not at stake for him. As he expressed:

> it seems really strange to me that percussionists, even jazz percussionists, are not able to stand up against this industrial standardization of their instruments, to force manufacturers to provide more acoustically interesting instruments. You were telling me earlier about the Cuban instruments that attracted Varèse's attention, but those were already imitations of African instruments provided with more interesting sonorities. Exotic instruments then, but already relatively traditional.[24] (Restagno, 1988, p. 47).

Thus, for Xenakis, the percussionists (and the musicians in general) should engage themselves in and take the responsibility of pairing for research of better instruments and sonorities with the industry but without a standardization of those characteristics. It is clear for the composer that the more diverse the SIX-XEN would be presented, the more adapted to the context in which the piece is performed and to the group that is presenting it and the better it could represent his main conceptions about acoustic instruments. Homogenization, standardization and reduction was the

[24] "mi sembra veramente strano che i percussionisti, anche quelli del jazz, non riescano a opporsi a questa standardizzazione industriale dei loro strumenti, a costringere i costruttori a fornire strumenti acusticamente più interessanti. Tu prima mi parlavi degli strumenti cubani che attrassero l'attenzione di Varèse, ma quelli erano già imitazioni di strumenti africani forniti di sonorità più interessanti. Strumenti esotici quindi, ma già relativamente tradizionali." (Restagno, 1988, p. 47).

opposite of what the composer expected from the research on acoustic instruments and specially when considering the interpretation of *Pléïades*.

In general, the musicians who interacted with Xenakis reported a certain dissatisfaction on his part with nearly all of the prototypes that were developed until then (as personally expressed by Michael Rosen, Robert Becker, James Wood, Phillippe Manoury, among others), with mentions and statements also present in his letters and interviews. Xenakis even expressed that he had a personal idea that was not exactly translated into practice[25]. However, although he might not have been convinced about specific Sixxens (as was reportedly the case with the Oberlin Percussion Group or New Music Concert prototypes), he continued to invite these groups for more concerts and encouraged them to participate in a continuous search for his acoustic instrument (more details are addressed on Chapter 9). Thus, as evidenced by the numerous reports from percussionists who knew him, Xenakis' constant dissatisfaction with the produced material was also accompanied with a sign of his acceptance of the diversity of possibilities for the construction of his concept.

In this sense, because the composer granted so much freedom to construct Sixxen, there was a clear belief that future projects would continue to produce a better instrument each time. In this case, the future research and experiments could bring a constant improvement of his instrument, continuing to be a more adequate and refined for the historical moment and the geographical place in which his work would be presented. He expressed concerns about the impoverishment of the timbral characteristics because of commercial interests, but he clearly intended to leave the continuous development of his acoustic instrument to future generations. This search for constant improvements to the SIX-XEN was then passed on to be the responsibility not only of the community of percussionists—in terms of both its construction and its continuous use—but also that of composers in terms of the development of its specific repertoire (the "instrumental evolution" as discussed with Serrou in 1997).

*Pléïades* stimulated many agents that had a responsibility towards the Xenakian instrument, the composer's conceptions of timbre and sonority, and, as a result, towards a rich and diverse environment of the spectral phenomena that could be achieved. This stimulation of various groups, regardless of Xenakis' personal opinions about the final results, brought a variety of prototypes and models into existence. The composer's overture of spirit, and the great diversity from which it resulted, would come to represent the concept of the work itself (*Pléïades*—from plural, plurality, diversity) and the fundamental conceptual forms of the elaboration of the rhythmic, melodic,

[25] As previously mentioned: "I described what I had in mind and several attempts have been made to produce it, but so far none have been satisfactory. They simply don't seem to know how to do it. Of course, it's difficult to obtain the quality of sound I'm asking for." (Varga, 1996, p. 180).

harmonic, and formal material. In this way, the diversity of the instruments would encompass the ultimate objective that permeates all of *Pléïades*: plurality and multiplicity.

After this exposition about the different ways Xenakis described his instrument and the aspects involving general instrumental construction, the emphasis will now be the Xenakian perspectives to Sixxen notation. While the Chapter 11 presents aspects of the notation developed by different composers, the discussion bellow will focus on the characteristics of Xenakis' personal approach.

## 3.2 The Xenakian notations for Sixxen

The Sixxen notation evolved with the publication of different versions of *Pléïades*. It is evident that the parts presented in the first version of the piece (Xenakis, 1979) are substantially different than when compared to the second (Xenakis, 1988), with the latter having the notation that is actually considered definitive to the instrument. To a certain degree, this is the consequence of many interactions with performers, such as the musicians of Les Percussions de Strasbourg that had a fundamental role in those changes. While practicing, the musicians noted that Xenakis' initial notation for Sixxen was not perfectly fitting the instrument; a lack of idiomatic correlation was evident because of the physical layout of the instrument, reinforcing the need for change.

### 3.2.1 The different versions of *Pléïades*

As previously pointed, Xenakis composed «*Métaux*» initially on millimeter paper specifying that D, B and G# should be respectively the lower, middle and higher notes of its future transcription (Fig. 3.6a). Because of the extremes notes, the application of those elements into a specific clef could indicate, that Xenakis was imagining a later transcription on a treble clef, and the 19 notes would be then distributed between $D^4$ and $G\#^5$. With this indication the final transcription for the SIX-XEN could use only one treble clef with the use of sharp and flat symbols (Fig. 3.6b), in a potential chromatic notation (that had little to do with the result sounds as noted in all descriptions of this instrument) and without any need for clef changing.

**a)** **b)**

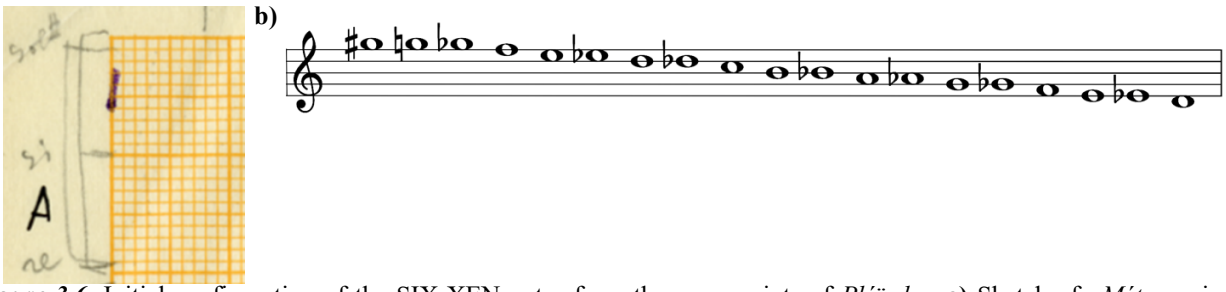
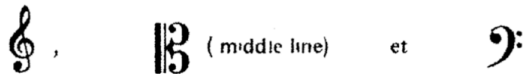
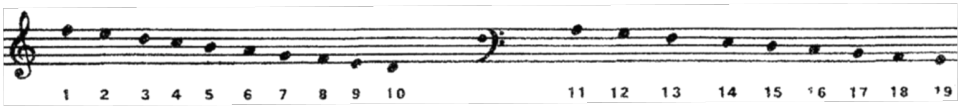



***Figure 3.6***. Initial configuration of the SIX-XEN notes from the manuscripts of *Pléïades*. **a)** Sketch of «*Métaux*» in millimeter paper specifying the higher, middle and lower notes respectively as G#, B and D (*re*, *si* and *sol#* in French). Source: © Famille I Xenakis DR (OM 28-17, p. 2). **b)** Result of the nineteen pitches that would constitute the potential transcription of this initial configuration of SIX-XEN notation.

However, from the composition on this manuscript to the final transcription, Xenakis adopted a much more wide-range notation, including the other clefs. As a result, in the first complete score published (Xenakis, 1979), the SIX-XEN notation is completely different and does not have any reference or correlation with D, B and G# (as lower, middle and higher notes). As addressed by Xenakis (1979, p. ii) in the description of the original score:

> The pitches are notated on one or two staves but with 3 different clefs:
>
> 
> 
>
> In my score, the notation is fictitious, that is, it does not correspond to the real pitches, it is only a way to identify graphically each one of the 19 different pitches of each SIXXEN:[26]
>
> 
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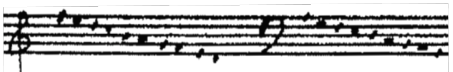
An explanation about the SIX-XEN in the end of «*Métaux*» complements the description, summarizing the aspects of its first specific notation as ultimately transcribed by Xenakis. As the composer pointed out:

> The pitches are noted on staves with three normal clefs. But the notated pitches have no relation with the real sounds of the metal components. The 19 pitches are noted on two staves:
> 
> or on one staff with a change of clef. The other notes are not used. Use metal hammers.[27] (Xenakis, 1979, «*Métaux*», p. 16).

In this version the accidentals are unnecessary (with Xenakis affirming that "The other notes are not used") and, as a consequence, a diatonic visual result emerged. Both explanations centralize the use of three clefs and indicate that this was a complete change when compared to the manuscript. Therefore, the 19 pitches engraved on the score from $F^5$ to $G^2$ and constantly divided between lines and spaces (spanning a range of nearly three octaves without accidentals) were hardly related to the metallic bars that had to be played with the layout of a Sixxen that was generally adopted (presenting a range of one and a half octaves). As can be perceived, thanks to the previous diatonic notation, excerpts could be constantly changing the clefs, resulting in passages with intense tangles (Fig. 3.7).

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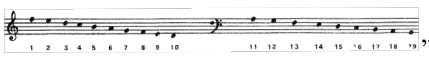
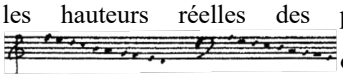
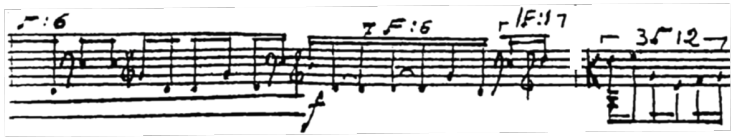
[26] "Les hauteurs sont écrites sur une ou deux portées, mais avec 3 clés différentes :

Dans ma partition, la notation est fictive, c'est-à-dire qu'elle ne correspond pas aux vraies hauteurs ; ce n'est qu'un moyen d'identification graphique de chacune des 19 hauteurs différentes de chaque SIXXEN :

" (Xenakis, 1979, p. ii).

[27] "Les hauteurs sont notées sur des portées avec trois clés normales. Mais les hauteurs notées n'ont aucun rapport avec les hauteurs réelles des pièces metalliques. Les 19 hauteurs sont notées sur deux portées :

ou sur une seule portée avec changement de clé. Les autres notes ne sont pas utilisées. Employer des marteaux métalliques." (Xenakis, 1979, «*Métaux*», p. 16).

**a)**



**b)**

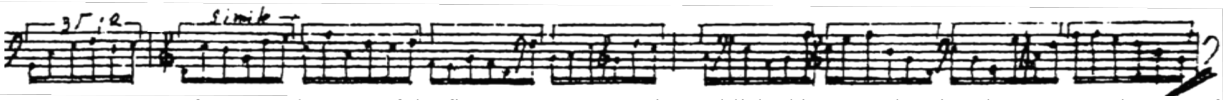


***Figure 3.7***. Excerpts from «*Mélanges*» of the first SIX-XEN notation published in 1979 showing the constant changes of clefs. **a)** Source: *Pléïades*, «*Mélanges*», meas. 100-101, Player D (Xenakis, 1979) – © Éd. Salabert. **b)** Source: *Pléïades*, «*Mélanges*», meas. 108-110, Player F (Xenakis, 1979) – © Éd. Salabert.

A new notation for Sixxen was published in 1988, which established a chromatic visual effect as a result of a new range from $F^4$ to $B^5$. It was a significant change for *Pléïades* that required to be the complete substitution of «*Métaux*» and «*Mélanges*» scores, and that was the reference that would be used for new pieces. This represented a drastic change in terms of the presentation of the score but one that turned to be the final one. As indicated: "The pitches are noted chromatically:  have no relation to the actual pitches."[28] (Xenakis, 1988, «*Métaux*», ind., p. 1).

With the application of exclusively treble clef and the use of accidentals, the Sixxen began to have a visual appropriation through the score that was correlated more to the reading of the percussion keyboards and at the disposal of its metallic bars, without any change of clefs (Fig. 3.8).

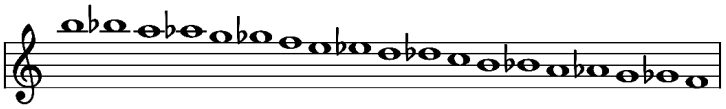


***Figure 3.8***. Second Sixxen notation established in the 1988 version of *Pléïades* (Xenakis, 1988).

It is interesting to perceive here that this final notation had similarities to the first one imagined by Xenakis and present in the manuscripts, both being chromatic notations. The differences are tied to range; while the manuscripts indicate a $D^4$ to $G\#^5$ range, the definitive notation presents a $F^4$ to $B^5$. It is also important to note how the 1988 notation for SIX-XEN drastically altered the presentation of the musical text to be performed. Comparing the below excerpts between the 1979 and 1988 notations, it is possible to glean the main differences in the writing between the two (Fig. 3.9).

[28] "Les hauteurs sont notées chromatiquement :  mais n'ont aucun rapport avec les hauteurs réelles." (Xenakis, 1989, «*Métaux*», ind., p. 1).

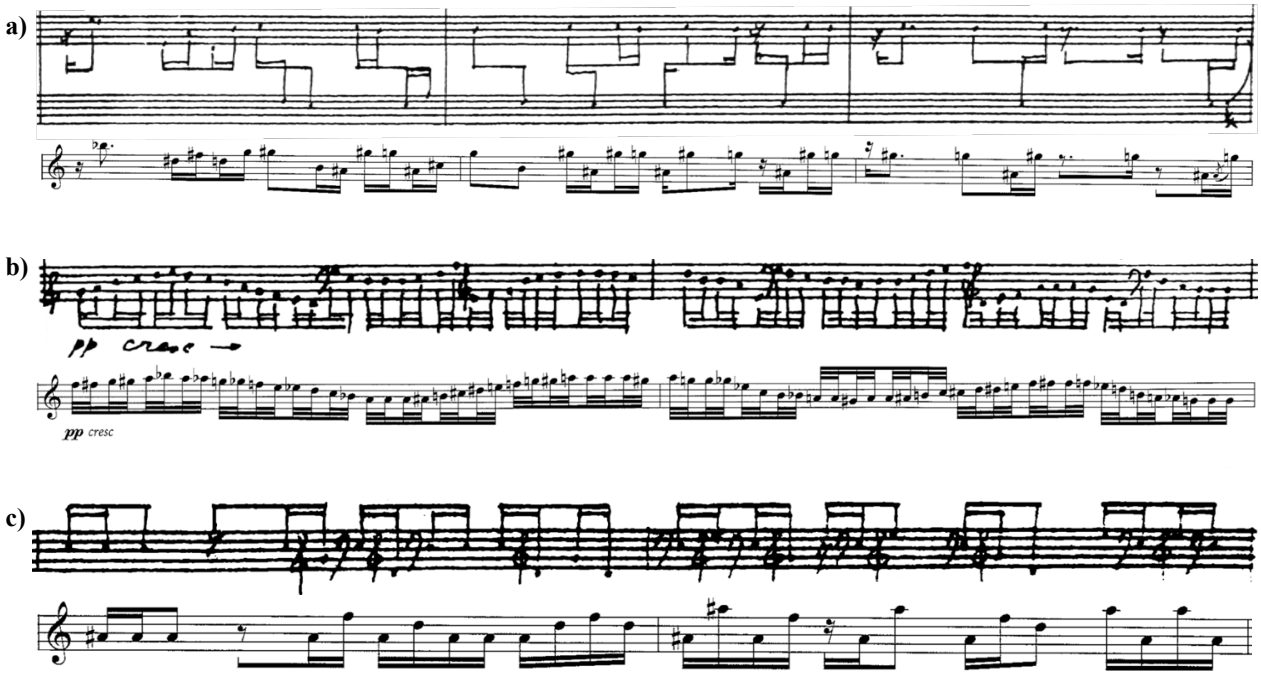



***Figure 3.9***. Comparison of the 1979 and 1988 versions of *Pléïades* focusing on the different notations. **a)** Source: *Pléïades*, «*Métaux*», meas. 86-88 (Xenakis, 1979 and 1988) – © Éd. Salabert. **b)** Source: *Pléïades*, «*Métaux*», meas. 92-93 (Xenakis, 1979 and 1988) – © Éd. Salabert. **c)** Source: *Pléïades*, «*Métaux*», meas. 92-93 (Xenakis, 1988) – © Éd. Salabert. **e)** Source: *Pléïades*, «*Métaux*», meas. 125-126 (Xenakis, 1979 and 1988) – © Éd. Salabert.

This change in the notation of 1988 was fundamental because it was adopted as the official and exclusive version by later composers. The origin of this change can be traced to the work of the performers, specifically from Les Percussions de Strasbourg, as it will be specifically addressed from now on.

### 3.2.2 The origins of a fundamental change in notation

The substantial differences between the 1979 and 1988 SIX-XEN notations were the result of the performers' influence. The notation that is now considered official one for a Sixxen is the product of practical needs due to the first prototype by Kolberg and the performative aspects of *Pléïades*. It is perceptible that the Kolberg's prototype was developed with a layout designed from F to B (as shown on Chapter 2 and better discussed in Chapter 9). This layout likely compelled the musicians to suitably adapt the notation because they were using a chromatic instrument disposed from F to B but were then confronted with the diatonic notation from $G^2$ to $F^5$ found in the 1979 version. Another important fact to consider is time, because when Xenakis finished the score in December 1978, the musicians were presented with a full score rather than individual parts. It was then the responsibility of the percussionists to prepare their own individual parts. As Jean-Paul Bernard stated:

> [...] in fact when they got the score, as there are 19 bars by Sixxen, Xenakis had made 19 lines. So, you can imagine that you can spot the two down or the three down and the three up, but in the middle to know which bar it is... [It is very difficult.] Thus, they in fact rewrote

> by hand on a normal staff, that is, I couldn't tell you on which note it started, but in fact, speaking for myself, I've been playing all my life with the handwritten score –I don't know who did it.[29] (Bernard, interview by author, 2019).

Confronted with short time to construct the instrument and to prepare the piece (besides the need to record it and to send to the choreographer), and perceiving the discrepancy between the instrument layout and its notation, the musicians were compelled to devise a new notation. Some of the scores produced with this new notation are still accessible at the Les Percussions de Strasbourg Archives (LPSA), presenting many pages of handwritten individual scores that were found there (Fig. 3.10).

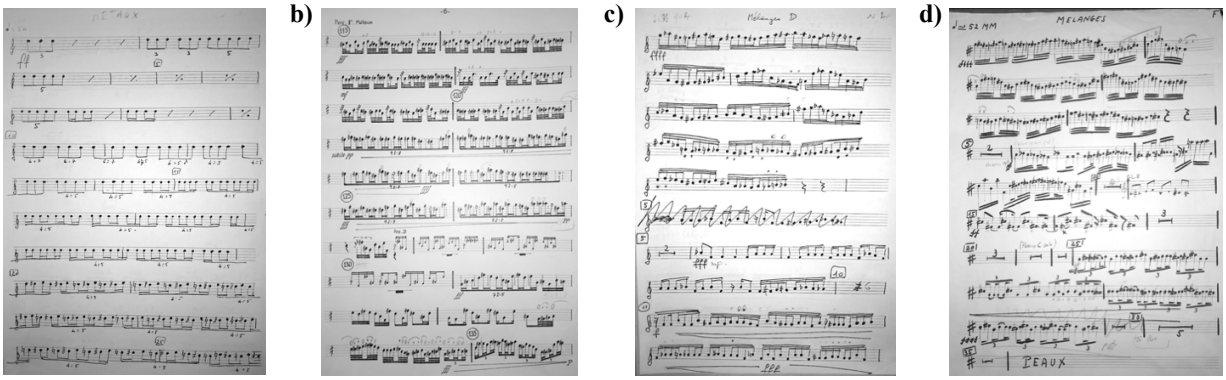



***Figure 3.10***. Handwritten individual scores of «*Métaux*» and «*Mélanges*» present in the Les Percussions de Strasbourg Archives (LPSA). **a)** Player D score, «*Métaux*», meas. 1-25. **b)** Player F score, «*Métaux*», meas. 115-135. **c)** Player D score, «*Mélanges*», meas. 1-18. **d)** Player F score, «*Mélanges*», meas. 1-35. Source of all: © LPSA.

Regarding these modifications in the notation, Georges van Gucht, the percussionist who premiered the piece, stated that:

> In fact, it was always in agreement with Iannis, because it had to be possible to realize it with a logical notation, in relation to the bass and the treble. The lower notes were in bass clef and the higher ones in treble clef. And so, it was a bit your approach to change, even if the notes are not really there...[30] (van Gucht, interview by author, 2020).

Some evidences appear to point out that from the very beginning, the percussionists were using their personal adaptations of the notation (Fig. 3.11).

[29] "[...] en fait quand ils ont reçu la partition, comme il y a 19 lames par Sixxen, Xenakis avait fait 19 lignes. Donc tu peux imaginer que tu peux repérer les deux d'en bas ou les trois d'en bas et les trois d'en-haut, mais au milieu savoir quelle lame c'est… Alors en fait ils ont réécrit à la main sur une portée normale, c'est-à-dire, je ne pourrais pas te dire sur quelle note ça démarrait, mais en fait, parlant pour moi, j'ai joué toute ma vie avec la partition écrite – je ne sais pas qui l'avait faite – écrite à la main." (Bernard, interview by author, 2019).

[30] "En fait, c'était toujours en accord avec Iannis, parce qu'il fallait pouvoir la réaliser avec une notation logique, par rapport aux graves et à l'aigu. Les graves c'était en clef de Sol et les aigus en clef de Fa. Et du coup, c'était un peu votre démarche de changer, même si les notes ne sont pas vraiment là…" (van Gucht, interview by author, 2020).

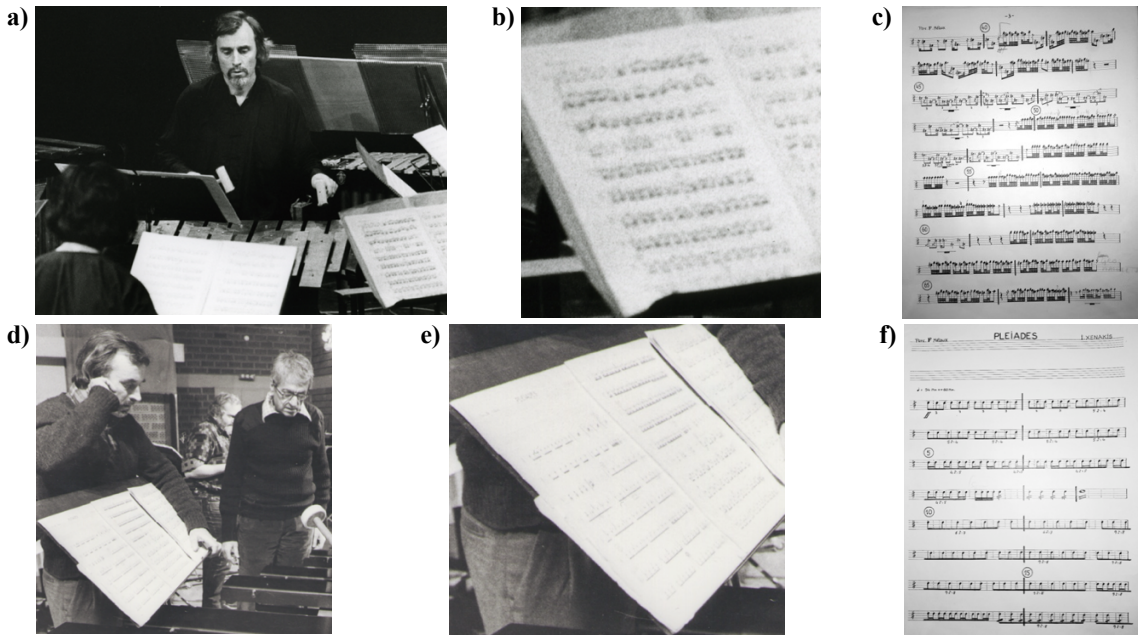



***Figure 3.11***. Photos indicating that Les Percussions de Strasbourg used manuscript transcriptions of «*Métaux*» and «*Mélanges*». **a)** Instrumental premiere of *Pléïades* on November 23, 1979. **b)** Zoom of photo a) highlighting the score used. **c)** Handwritten score with similarities with photo b). **d)** Recording with Xenakis in January 1986. **e)** Zoom of photo d) highlighting the score used. **f)** Handwritten score with similarities with photo e). Sources: © LPSA.

The photos of the instrumental premiere on November 23, 1979 (Fig. 3.11a, b and c) and the recording section with Xenakis in January of 1986 (Fig. 3.11d, e and f) corroborate this idea, indicating that the individual scores used at the moment were their own handwritten parts. About this initial moment, Keiko Nakamura (interview by author, 2020) reiterated that:

> At the beginning there were not really any notes or any clefs I think. And when we changed to the 2nd version, it was much easier for us. If it was marked C, we'll tap on the C, when it's marked G or G #, even if it's not a G # it's the position of a G #. That's how we proposed it to him. We gave him a facility for us. It's like the box [of notes to play the end of «*Claviers*», from meas. 111] it was the same, we give the feasibility for the musicians, because imagine 19 lines? It is impossible to read. It was Jean Batigne who proposed this kind of thing. He was the only person who dared to say things really openly to Iannis, always. "Iannis, it's not possible, do you realize that for a musician, you can't play 19 notes like that. We're used to the piano keyboard, so even if it's not the right note, we have to change it." And he understood right away, so he made the score for today, he changed the notes. Because it was impossible to realize, 19 notes like that next to each other, it was impossible. It was at the request of the musicians.[31] (Nakamura, interview by author, 2020).

[31] "Tout au départ il n'y avait pas vraiment les notes ni aucune clé je crois. Et quand on a changé pour la 2eme version, pour nous c'était beaucoup plus facile. Si c'était marqué Do on va taper sur le Do, quand c'est marqué Sol ou Sol #, même si ce n'est pas un Sol # c'est la position d'un Sol #. C'est comme ça qu'on lui a proposé. On lui a donné une facilité pour nous. C'est comme la boîte c'était pareil, on donne la faisabilité pour les musiciens, parce qu'imagine 19 lignes ? C'est impossible à lire. C'est Jean Batigne qui proposait ce genre de choses. Lui c'est la seule personne qui osait dire les choses vraiment ouvertement à Iannis, toujours. « Iannis ce n'est pas possible ça, tu te rends compte pour un musicien ? on ne peut pas jouer 19 notes comme ça. Nous on a l'habitude du clavier de piano, donc même si ce n'est pas la bonne note, il faut qu'on change ça. » Et il a compris tout de suite et hop, il a fait la partition d'aujourd'hui, il a changé les notes. Parce que c'était impossible à réaliser, 19 notes comme ça à côté l'une de l'autre, c'était impossible. C'était à la demande des musiciens." (Nakamura, interview by author, 2020).

Because of the extensive exchanges between Les Percussions de Strasbourg and Xenakis, it is probable that this change was suggested in both the official notation and the score published in 1988. However, the personal transcription of «*Métaux*» and «*Mélanges*» to a chromatic notation using a unique clef was not exclusive to the French ensemble, as this approach was used by other groups. As pointed out by Sylvio Gualda (interview by author, 2020):

> we wrote the score as if he had written it for a vibraphone, you know that, for a marimba [...]. We did that to make it easier for the percussionist to read. There is a C you play a C, but in reality, it's not a C, if you want: it's a C transformed into a quarter tone between 6 people. [...]
> So, for the convenience, I say of the percussionist, it has been written as a marimba part, but in reality, if he plays C E F it's not true, he doesn't hear it, he has a position that he knows since he was little in relation to a keyboard, so it's playable. It's not an instrument where you had to learn to play again, there's a keyboard in front of it, but it was not a keyboard that gave C D E F G A B C. We are in the creation here, nothing is absolute.[32]

James Wood also stated that he preferred to transcribe the whole notation to treble clef when he first played the piece at the England Percussion Festival in 1988. As he explained, this method helped perform the piece by accelerating the process to read the score. As Wood stated: "I in fact re-notated my part on a treble clef stave so I could read it as a normal tuned keyboard (scordatura of course) – and I remember that all the other players in the 1988 production regretted that they had not done the same." (James Wood, email to author, April 20, 2020). Another example of this method came from the members of the Kroumata Percussion Ensemble. The group performed *Pléïades* for the first time in Stockholm on February 3, 1989, and Anders Holdar said the following about altering the score:

> Around that era one of our members, Anders Loguin, played in an international composed percussion group for a performance of the piece in Queen Elizabeth Hall in London[33]. It must also have been one of the first years of the 90.ies. And after our discussions in the group, he asked Xenakis if he could think of rewriting the sixxen movement to a simple G-clef score where the tones were marked at the place of the bar on the instrument no matter what pitch it had, instead of the difficult notation he had chosen with four or five different clefs following the very pitch of the bar. We got a new score in less than two weeks from the publisher and could read and play it properly at once! (Anders Holdar, email to author, November 24, 2020).

It is then deduced how the changes in the notation for Sixxen were an influence by the performers and that it resulted from a practical need by different groups. This new notation was

[32] "on a écrit la partition comme s'il l'avait écrit pour un vibraphone, vous savez ça, pour un marimba [...]. On avait fait ça pour faciliter la lecture du percussionniste. Il y a un Do vous jouez un Do, mais en réalité ce n'est pas un Do, si vous voulez : c'est un Do transformé en quart de ton entre 6 personnes. [...]
Alors pour la commodité, je dis bien du percussionniste, on l'a écrit comme une partie de marimba, mais en réalité s'il joue Do Mi Fa ce n'est pas vrai, il ne l'entend pas, il a une position qu'il connait depuis qu'il est petit par rapport à un clavier, donc c'est jouable. Ce n'est pas un instrument où il a fallu réapprendre à jouer, il y a un clavier devant, mais ce n'était pas un clavier qui donnait Do Ré Mi Fa Sol La Si Do. On est dans la création là, rien n'est absolu." (Sylvio Gualda, interview by author, 2020).

[33] This is essentially the same event that James Wood previously mentioned, the England Percussion Festival 1988.

substantial to all new pieces that would require Sixxen because it became the definitive notation specifically applied to the instrument.

### 3.2.3 The SIX-XEN notation in *Idmen A B* (1985)

The use of sixxens in *Idmen B* is optional, and the performers have the choice whether or not to use this timbre in the piece. When Xenakis composed this piece, the second version of the Sixxen notation was not yet published. It is then verifiable in *Idmen B* that the instrument could be used in essentially two specific passages: at the end of the second and third parts (called respectively «*PB*» and «*PC*»). As will be emphasized, each passage has a specific notation for Sixxen with one being more connected to the notation that Xenakis developed in the first published score of *Pléïades* (Xenakis, 1979) and the other with similarities to the notation developed by the percussionists and published only later in 1988 (Xenakis, 1988).

Thus, at the end of «*PB*», one sixxen could substitute a glockenspiel (Fig. 3.12a) in a short passage of four measures. It is clear that this transitional section was originally written for glockenspiel and xylophone, and only later added a sixxen as a possible replacement. The notation was specifically written for glockenspiel with an indication of octave higher but easily adaptable for one sixxen if considering the second notation (Xenakis, 1988). This may show that Xenakis was aware of the changes made by the percussionists when composing *Idmen*.

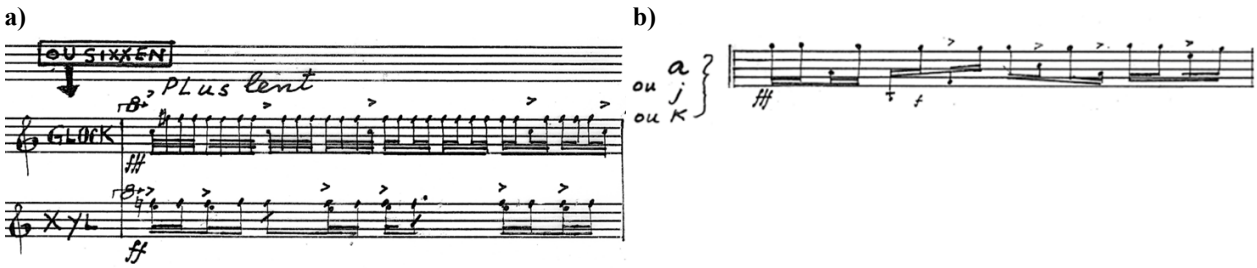



***Figure 3.12***. Examples of the two types of Sixxen notation used by Xenakis in *Idmen B* (1985) in «*PB*» and «*PC*». **a)** Excerpt from section «*PB*» – meas. 69. **b)** Excerpt from section «*PC*» – meas. 25. Source of both: *Idmen B*, (Xenakis, 1985) – © Éd. Salabert.

The second passage in *Idmen B* (during «*PC*») is longer than the first (with 12 measures) and implicates another type of notation for one or two sixxens (Fig. 3.12b). Xenakis indicates at the beginning of «*PC*» that different percussion timbres sets are available for the percussionists' choice, and among them he suggested that seven sounds of a sixxen ("*Sixxen repartis sur 7 régions*") could be used; this option was called "j" by the composer. A new section begins in meas. 25 and the option j could be the choice of the interpreter (with the option for doubling, showing that *Idmen A B* can incorporate two sixxens). Because the passage has three different timbres sets possible ("a or j or k"),

the composer used a generic notation that could fit all possibilities[34], using all the spaces in the staff and ledger line. Thus, the kind of notation used coincidentally appears to visually refer to the first SIX-XEN notation adopted by Xenakis in 1979 when the *Pléïades* transcription was published.

## 3.3 The Xenakian factory of unheard sounds

> *It's important, therefore, to go beyond the limits of the pitch versus time domain because that relationship only takes into account the melody and the rhythm. The material itself may become an exclusive factor. One of the basic questions of composition for me is how to produce interesting sounds and what I can do with them.*
> Iannis Xenakis (Varga, 1996, p. 67)

The creation of a new acoustic instrument by a composer could gather and represent many of his/her compositional approaches, essential inspirations, thoughts and the common practical aspects of his/her work. The SIX-XEN is one of these cases, because it reflects Xenakis' compositional traits and sound research developed in previous pieces and throughout his career. By the insertion of the instrument in the wider context of his work, a continuity between the predominant traits of his artistic research and select fundamental characteristics of his acoustic instrument will emerge.

First and foremost, it is important to note that Xenakis addressed the classification of sounds in the 1977 text "Des univers du son" (around the composition of *Pléïades*)[35], and that the composer included it in his own book *Kéleütha* (Xenakis, 1994, pp. 112-120). Rather than organize an organological system of instrument classification, the composer sought to devise a more generalized systematization about the sound categories and the different layers (that he called "*universes*") that coordinate and determine the manifestation, production, organization and perception of sounds. It is essentially a categorization of different existing planes that may be considered as determinant to the compositional interests, specifically including the instrumental sound. In this text, he established a division between: material or hyletic universe ("*univers matériel, hylétique*"), universe of forms and systems of organization ("*univers des formes et des systèmes d'organization*"), universe of senses and perceptions ("*univers des sens*") and political and social universe ("*univers politique et social*").

In the first category of hyletic universe, Xenakis placed sound elements from different origins and included musical instruments, stating that "It is that of the materials, of the sound hyles, of the elements, according to their origin and the techniques used"[36] (Xenakis, 2016, p. 172). He would then subdivide the elements into four categories within the hyletic universe: instrumental sounds, sounds

[34] The other possibilities are "2 bongos, 2 tumbas, 3 toms" (as option "a") or 7 woodblocks (as option "k").
[35] "Des univers du son" ("Universes of sound" in French) was a postface to the second edition of *Problèmes de la musique moderne* (Schlœzer & Scriabina, 1977), book that was reprinted in 2016 and used here (Xenakis, 2016).
[36] "C'est celui des matières, des hylès sonores, des éléments, en fonction de leur provenance et des techniques employées" (Xenakis, 2016, p. 172).

from nature or from the industrial world[37], sounds produced artificially by analog equipment[38] and sounds produced artificially by digital equipment[39]. The composer addressed in this text the subdivision of instrumental sounds. For Xenakis, "This universe naturally includes the types of notation, but also the playing techniques of the body, hands, feet, fingers, therefore human limits of physical virtuosity, endurance, athleticism, the richness of timbres, intensity, pitch, maneuverability, etc."[40] (Xenakis, 2016, p. 172).

This hyletic universe would thus contain all instruments created, being also a category of raw material and basic sound elements that would provide the fundamental materials for which the other three universes could give signification and resignification. Therefore, the other universes are fundamental in the constitution, organization and perception of the hyletic materials, with each one doing so in a particular way and by specific means (Fig. 3.13).

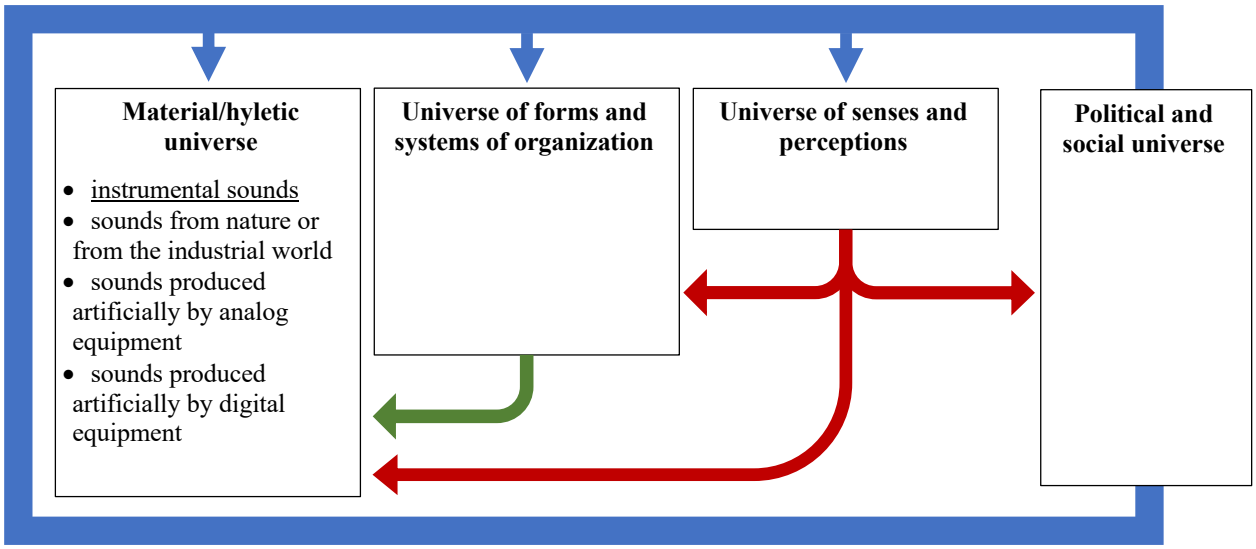



***Figure 3.13***. Schematic representation of the universes that characterize for Iannis Xenakis the constitution of the music manifestation. The arrows indicate the dialogs and correlations that one universe can establish with other(s).

[37] As he complemented, "made available to the musician by the microphone-recorder-acoustic speaker chains. 'Concrete' music was founded on these sounds." Original text: "mis à la disposition du musicien par les chaînes micro-magnétophone-enceinte acoustique. La musique « concrète » a été fondée sur ces sons." (Xenakis, 2016, p. 172).
[38] As he stated about, "such as frequency and white noise generators. Processing equipment from the previous sub-universe should be included." Original text: "tels que les générateurs de fréquences et de bruits blancs. Il faut inclure les équipements de transformation du sous-univers précédent." (Xenakis, 2016, p. 172).
[39] As stated: "The sounds produced by computers with the help of mathematical programs coded in digital and then converted into sounds by digital-analog converters and low-frequency chains." Original text: "Les sons produits par des ordinateurs à l'aide de programmes mathématiques codés en numérique puis convertis en sons par les convertisseurs numériques-analogiques et les chaînes basse-fréquence." (Xenakis, 2016, p. 172).
[40] "Cet univers comprend naturellement les types de notation, mais aussi les techniques de jeu du corps, des mains, des pieds, des doigts, donc des limites humaines de virtuosité physique, d'endurance, d'athlétisme, les richesses en timbres, intensité, hauteur, maniabilité, etc." (Xenakis, 2016, p. 172).

As perceptible in Fig. 3.13, Xenakis gathered universes of different natures (materials, organizations, ways to perceive and sociopolitical conditions and determinations) that establish combinations to produce sense in music. The composer also established mutual influences in this system, having the universe of senses/perceptions and the sociopolitical universe as predominant roles in the others. The hyletic universe is perceived as containing the ground elements that will be perceived, treated, understood and decoded by the other ones. Thus, it has a fundamental role through being characterized as the raw material of the system.

As the composer expressed, this system is based on the human intelligence and is determinant that creativity diversifies the potential manifestations of the hyletic universe:

> What is the essence of these materials? It is human intelligence in a certain state of crystallization. An intelligence that seeks, questions, deduces, reveals and foresees at all levels. It seems that music and the arts in general must necessarily be a crystallization, a materialization of this intelligence. Naturally this intelligence, although universal on a human scale, is diversified by the individual, by talent, and by everything that makes men different from one another.[41] (Xenakis, 1994, p. 15).

Situating the instruments in what Xenakis conceived as "the universe of sounds" is important, but how a composer could codify some processes that are manifestly present is equally essential. This is why, in these theoretical aspects of Xenakis' considerations about sound production and musical instruments, it is fundamental to determine what the composer called microcomposition and macrocomposition[42]. They can be both understood by the level in which the composer could interfere in the sound production. Microcomposition relates to the level of the production, synthesis or transformation of the individual sounds, and of their internal constitution and fundamental characteristics; this definition is rooted in the prefix micro, which would define the proper constitution of a sound taken in an individual way. Macrocomposition, on the other hand, is linked to the possible compositional constructions, the engenders and the links that are woven between different sounds to constitute formal structures by the procedural methodology guided by the choices and the decisions of the composer; contrasting to micro, the prefix micro would define structures of a broader level and external aspects as result of the gathering of sounds. The former is related to the internal constitutions of a sound taken in isolation (as micro properties) and the latter is related to the external aspects that will be established between several sounds in the final compositional material (as macro

[41] "Quelle est l'essence de ces matériaux ? C'est l'intelligence humaine dans un certain état de cristallisation. Une intelligence qui cherche, questionne, déduit, révèle et prévoit à tous les niveaux. Il semble que la musique et les arts en général doivent nécessairement être une cristallisation, une matérialisation de cette intelligence. Naturellement celle-ci, bien qu'universelle à l'échelle humaine, est diversifiée par l'individu, par le talent, et par tout ce qui rend les hommes différents les uns des autres." (Xenakis, 1994, p. 15).

[42] Xenakis mentioned in reality that these aspects could be divided in three main ones: micro, meso and macrocomposition. However, he never really gave a straight definition for each one, because he always preferred to treat them with examples. This terminology is present in different texts, being accessible in "Les chemins de la composition musicale" (Xenakis, 1981), republished as "Music Composition Treks" (Xenakis, 1985), and included as a chapter in Kéleütha (Xenakis, 1994, pp. 15-33).

characteristics). Both manifest themselves in time and can be understood in terms of vertical and horizontal characteristics; ultimately, what differentiates these terms is more the level of their application and manifestation. In microcomposition, the composer interferes with the individual manifestation of a sound and its internal characteristics while in macrocomposition, the composer interferes with the collective manifestations of sounds in larger structures that represent a gathering of different individual sounds.

In his writings regarding these terms, Xenakis is not strictly defining macrocomposition but is rather giving practical examples of research possibilities at this level. As a result, he wrote nine actions that could stimulate the creation on a macrolevel (Xenakis, 1994, p. 22), being essentially tied to actions of his own compositional approach. He also did not strictly define microcomposition, but when he wrote about this level of composition, Xenakis gave examples generally tied to his research about the synthesis and transformation of sounds in computer music. Even if the meaning he gave was for electroacoustic music, it is fundamental here to note that he highlighted many important details of this search for new sounds. The interference in basic structures of the sound constitution was something crucial for him and, for Xenakis, the composer should interfere in both levels, even if it would require specific skills and procedural methods of a "new type of musician"[43]. It is clear that even if he frequently gave more examples of computer music in the microcomposition, he was not only referring to synthesis and transformations achievable by computer programs but also the interference in the characterization of acoustic sounds. In this sense, the creation of SIX-XEN is relevant in his microcompositional research because by interfering in the internal sonorities of an acoustic instrument, Xenakis was working in the dimension of this micro-category. Therefore, it is important to highlight that in suggesting the construction of SIX-XEN, Xenakis was in the very constitution of new individual acoustic sounds. He was in search of sounds whose individual emergence must be understood in terms of microcomposition but from which *Pléïades* emerges as the macrocompositional component. The SIX-XEN was not an isolated concept/object in Xenakis' career nor a "thing" to be exclusively tied to one piece for percussion; on the contrary, it encompassed the many approaches to music that Xenakis had carefully crafted for decades. The instrument was ultimately an embodiment of profound characteristic traits in his work. As Sève (2013, p. 34) stated:

> Before being a tool, a musical instrument is a sound idea, a particular sound approach to the

[43] As he stated: "Consequently, it is clear that a new type of musician is necessary, that of the artist-conceiver of new forms, free, abstract and aiming at making more complex and generalizing the organization of sounds on several levels. For example, a form, a construction, an organization conceived on the model of Markovian chains, or according to nested probability functions, can be used simultaneously, at various levels of musical microcomposition, mesocomposition and macrocomposition." Original text: "En conséquence, il est clair qu'un nouveau type de musicien est nécessaire, celui de l'artiste-concepteur de nouvelles formes, libres, abstraites et visant à rendre plus complexe et à généraliser l'organisation des sons sur plusieurs niveaux. Par exemple, une forme, une construction, une organisation conçue sur le modèle des chaînes Markoviennes, ou d'après des fonctions de probabilités emboîtées, peut être utilisée simultanément, à divers niveaux de microcomposition, de mesocomposition et de macrocomposition musicales." (Xenakis, 1994, pp. 16-17).

> world. The instrument, in general, precedes the work, written or improvised, that it will allow to be played: in a certain way, the sounds that it allows to be played have a value in themselves, a value that is provisionally independent of that of the music that it will interpret. In other words, every instrument is a double invention: technical (invention of a technical object) and aisthesic (invention of a sound or a type of sound).[44]

Considering the broad artistic and scientific research on sound developed by Xenakis, the SIX-XEN must be understood as consequent to previous experience by its creator. As the physical result of his main concerns in composition, the object reflects some of Xenakis' particular interests. In this subchapter, these particular interests will be described in four aspects: microtonality, beating effects, glissandi, and unfaithful repetitions.

### 3.3.1 Microtonality

The use of intervals smaller than a semitone or not proportional to a semitone is common in Xenakis' work. His earlier studies and production show an interest in elements not considered by the limits of the equal temperament and the standardization of the conventional pitches. In terms of his earlier notes, the Notebook 9 (originally called "Carnet 9" in the *Collection Famille Iannis Xenakis*) has information regarding the subject. The notes mainly produced during Messiaen's classes at the Conservatoire de Paris and it shows Xenakis' master addressing different composers while also presenting microtonality as a characteristic element of the non-European musical traditions through examples of Indian music. With this, it appears that Messiaen introduced theoretic aspects of Ivan Wyschnegradsky and Nicolas Slonimsky's music and microtonal approaches. As Xenakis (Notebook 9, p. 25) noted:

> Vischnegradsky
> Scale 3⁄4 tones ≈ scale by tones
> Slonimsky
> Thesaurus of scales
> addition of 1 or more tones in the scale
> interpolation
> ultra[polation]
> infra[polation][45]

The discussion about microtonality also appears in Xenakis' own written materials. When explaining the Sieve theory, a mathematical tool that Xenakis applied in many pieces, he described

[44] "Avant d'être un moyen, un instrument de musique est une idée sonore, une approche sonore particulière du monde. L'instrument, en général, précède l'œuvre, écrite ou improvisée, qu'il va permettre de jouer : d'une certaine façon, les sons qu'il permet de jouer ont une valeur en eux-mêmes, valeur provisoirement indépendante de celle de la musique qu'il va interpréter. En d'autres termes, tout instrument est une invention double : technique (invention d'un objet technique) et aisthésique (invention d'un son ou d'un type de sons)." (Sève, 2013, p. 34).

[45] "Vischnegradsky / Gamme 3⁄4 tons ≈ gamme par tons / Slonimsky / Thesaurus of scales / ajout 1 ou plusieurs tons dans la gamme / interpolation / ultra[polation] / infra[polation]" (Xenakis, Notebook 9, p. 25).

the possibilities of microintervals and their potential applications to construct new scalar materials while equally understanding even non-Western music[46].

It is crucial to consider Xenakis' interests in microtonality in terms of the practical possibilities that he developed in his instrumental pieces as well[47]. His first masterpieces *Metastasis* (1953-54) and *Pithoprakta* (1955-56) demonstrate a vivid interest in microtonal materials. Thus, many examples of his subsequent instrumental music present microtonal passages: *Medea-Senecae* (1967), *Anaktoria* (1969), and *Antikhthon* (1971) use third and quarter-tones; *Nomos alpha* (1967), *N'Shima* (1975), *Phlegra* (1975), *Dmaathen* (1976), *Dikhthas* (1979), *Nekuia* (1981), and *Alax* (1985) use quarter-tones; *Akanthos* (1977) and *Kottos* (1977) use eighth-tones. Xenakis primarily abbreviated his notation with differences of quarter or third-tones as indicated in Fig. 3.14[48]. These are therefore the two ways he generally systematized the indication for microtonal frequencies, whether for orchestra, smaller chamber music or solo repertoire.

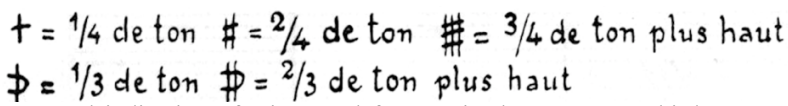



***Figure 3.14***. Xenakis' general indication of microtonal frequencies by quarter or third tone. Source: *Anaktoria*, p. 1 (Xenakis, 1971) – © Éd. Salabert.

When addressing the description of SIX-XEN, these two kinds of microintervals were exactly what Xenakis suggested. As he stated, "The second essay was to have a new metallic instrument built, called the SIX-XEN, comprising nineteen irregularly distributed pitches with steps of quarter-tones or third-tones or their multiples" (Xenakis, 1979, p. i). The composer had thus characterized his instrument exactly the same way as he had constructed the microtonality and its notation of many of his previous pieces. These microintervallic characteristics of the SIX-XEN could then be perceived as a continuation of his practical approaches on the frequency parameters. This aspect of the instrument generates multiple acoustic effects that were deliberately sought by the composer because with notes so closely present, there are frequently additive effects (such as beating) and subtractive effects (such as the cancellation of frequencies by phase opposition) occurring, as well as different

[46] Remembering that this text was initially produced to be presented during the event Musics in Asia–International Music Symposium that took place in Manila (Philippines) from 12 to 16 April 1966. It is one of the many texts that would be produced in this line of reasoning and it put in evidence the importance that the non-European music took in Xenakis' theoretical universe (see more details in Chapter 1, p. 61).

[47] The focus of this discussion will be emphasizing instrumental music but it is also important to consider that this initial period can also attest to a certain interest in microtonal structures because of the electroacoustic approaches that were being developed. Iannis Xenakis' first electronic pieces were produced in the *Groupe de Recherches Musicales* (GRM). See more details in Solomos (1996) or Harley (2002).

[48] It is important to mention that this is the notation that Xenakis used to indicate the Indonesian scales he heard in his 1972-1973 trip to Java and Bali. On the tape identified as DONAUD 0602 1053–Xenakis 920, called "Jogjak sultan", he transcribed a scale he called "slendro" using the notation of fourth of tons (see more details on Chapter 1).

types of clusters. Used in various ways, these effects were an attempt to stimulate the perception of sounds in very particular ways.[49] In Xenakis' search for different sonorities, it is also important to emphasize that since microtonality would represent the composer's different interests, its presence can be perceived in multiple layers throughout *Pléïades* and one additive effect of the microtonal characteristic of the SIX-XEN will now be addressed: the beating effect.

### 3.3.2 Beating effect

The beating effect is evident in the SIX-XEN conception, being a frequent acoustic phenomenon that occurs in its sonority. Even if Xenakis addressed few about beating effect in its descriptions[50], he was consciously creating an eminent instrument of beating effects. The composer precisely and briefly defined the beating effect when he affirmed in a 1980 interview with Varga that: "If you tune two nearby strings on the piano a little bit off, you hear the pitch, but also a wu-wu-wu effect. The number of beats per second corresponds to the difference between the frequencies. For instance, if one string has a frequency of 440 and the other 442, we get two beats per second. I use a special sign in the score to indicate this." (Varga, 1996, p. 29). In another interview[51] he also specified that "Traditional instruments can make [...] sounds which resemble noise too like '*battements*' [beatings], which I call sounds that are split in their sonority. Those aren't multi-phonics, they have a lot of harmonics but they are close, like clusters which don't sound like that, more like a sound very thick in the bass" (Matossian, 2005, p. 318).

Xenakis was always interested in the beating effects between instruments alone, between voices alone or between instruments and voices simultaneously, being also something verifiable in his electroacoustic approaches. This interest was paramount in his approach and influenced his production from his initial studies and first pieces to throughout his career. His first notebook (called *Carnet 1* at the *Collection Famille Iannis Xenakis*, here mentioned as Notebook 1) refers to aspects of his relation with beating effects, greatly detailing this interest and questioning how it is perceived and how it would be interesting to use in composition. On August 31, 1953, Xenakis even described

[49] As Globokar (1980) mentioned, "Obtaining micro intervals (smaller than a semitone), seem to pose difficulties in realization, because our instruments are not built for their production. I don't think the difficulty lies in their production but rather in their perception." Original text: "L'obtention des micro intervalles (plus petits qu'un demi-ton), semblent poser des difficultés de réalisation, car nos instruments ne sont pas construits pour leur production. Je ne pense pas que la difficulté réside dans leur production mais plutôt dans leur perception." (Globokar, 1980, n.p.).

[50] The rare mention is present in an interview, when the composer mentioned: "the six instruments should have sounds close to nineteen previously fixed notes which act as tone centres. In other words, each of the six players plays a particular note belonging to one of the centres, so that the six notes of one tone centre differ slightly from one another. In this way you create beats and a kind of complex sound around the same note. [underline added]" (Varga, 1996, p. 180).

[51] He stated this in an interview with Nouritza Matossian in 1990, when she asked if it was true that he preferred acoustic instruments (that he called "traditional instruments" in this interview) over digital instruments because they produced more complex sounds.

a situation that caught his attention and inspired him to test the possibilities of the beating effect. As he wrote:

> Delaunay of the Rad. Dif. Française[52] for amusement began, at a time when the loudspeakers on the roof of Marseilles (July 25, 53) were playing the 50 periods or a siren sound, to interfere with his own voice and to cause interference beats of all beauty. He was having fun. I didn't feel to play that day because the work was still enormous, but I recorded the fact. I can use the phenomenon musically and consciously in the serial of the anastenaria[53]. It is of enormous dynamic and tragic effect. [underline added][54] (Xenakis, Notebook 1, p. 43).

This note is marked by the title "interferences" (*interférences* in French) and acknowledges hearing experiments, showing that the composer was still discovering the beating effect but was also intrigued to apply the effect in a future composition. As consequence of this experience in Marseilles, Xenakis algebraically calculated the distances of semitone and comma intervals present in an octave. He then created an exercise of distancing two notes in unison until they produce beatings[55] and perceiving its hearing effects. It is by the result of his perceptive sensibility in contact with the material produced that he concluded:

> Conclusions from experiments.
> 1) Very difficult to achieve intervals < 1⁄2 tone absolutely i.e. starting from one note.
> 2) Very easy to realize intervals <1/2 relatively. That is, by relying on a note that plays and counting by "tuning" to it the beats caused.
> 3) The ear only follows the beats!!
> Very important colossal result!
> To be able to command the calm and inert unison and to give it a new internal life qualitatively but so intense!!
> I am no longer afraid of very long durations. By varying the pattern of the beats, a new musical thought is obtained.
> 4) With the interference I obtain the cracking of the sound of its essence, its vibrations its height. (generalization of the use of the 1⁄4 of tones)
> 5) By varying the interference according to the harmonics, the effects can be unexpected! E.g. a wind instrument in the very low range with a bow in the high range or the opposite!!![56]

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[52] A clear reference to the French radio broadcast – *Radiodiffusion française* (RDF).

[53] Xenakis is mentioning the *Cycle Anastenaria*. For more details Barthel-Calvet (2011a) addressed many aspects of this cycle.

[54] "Delaunay de la Rad. Dif. Française pour s'amuser s'est mis à un moment où les haut-parleurs du toit de Marseille (25 juillet 53) faisaient entendre les 50 périodes ou un son de sirène, à interférer avec sa propre voix et à provoquer des battements d'interférence de toute beauté. Il s'amusait. J'avais pas envie de jouer ce jour-là car le travail était encore énorme mais j'ai enregistré le fait. Je peux utiliser le phénomène musicalement et consciemment dans le sériel des anastenaria. C'est d'un effet dynamique et tragique énorme." (Xenakis, Notebook 1, p. 43).

[55] As it is described in the Notebook 1: "Starting then from unison and reach ~ the 30 beats (the number corresponds to minimum audibility, the threshold of distinct perception) then returning to unison." As originally written: "Partir donc de l'unisson et atteindre ~ les 30 battements (le nombre correspond à l'audibilité minimum, seuil de la perception distincte) puis revenir à l'unisson." (Xenakis, Notebook 1, p. 47).

[56] "Conclusions des expériences. / 1) Très difficile à réaliser des intervalles < 1⁄2 ton absolument c'est-à-dire en partant d'une note. / 2) Très facile à réaliser des intervalles <1/2 relativement. C'est-à-dire en s'appuyant sur une note qui joue et en comptant en «s'accordant» sur elle les battements provoqués. / 3) L'oreille ne suit plus que les battements !! / Résultat colossal très important ! / Pouvoir commander l'unisson calme et inerte et lui donner une vie interne nouvelle qualitativement mais tellement intense !! / Je n'ai plus peur des durées très longues. En faisant varier le dessin des battements on obtient une nouvelle pensée musicale. / 4) Avec les interférences j'obtiens la fissuration du son de son essence-même, ses vibrations sa hauteur. (généralisation de l'emploi des 1⁄4 de tons) / 5) En variant les interférences suivant les harmoniques les effets peuvent être inattendus ! P.ex. un instr. à vent dans le très grave avec un archet dans les aigus ou le contraire !!!" (Xenakis, Notebook 1, p. 47-48).

(Xenakis, Notebook 1, p. 47-48).

These initial experiences spawned an important trait of his compositional approach. From then on, several of his pieces would be essentially marked by the presence of this kind of effect and for the composer, by the aspect that the effect would be better realized if indicated clearly and by the perception of the beats and their quantity. As a result, he codified a specific notation for the beating effect indicating the amount of beating required, the ascending or descending direction to achieve it and the potential development of the quantity of beats in time[57] (Fig. 3.15).

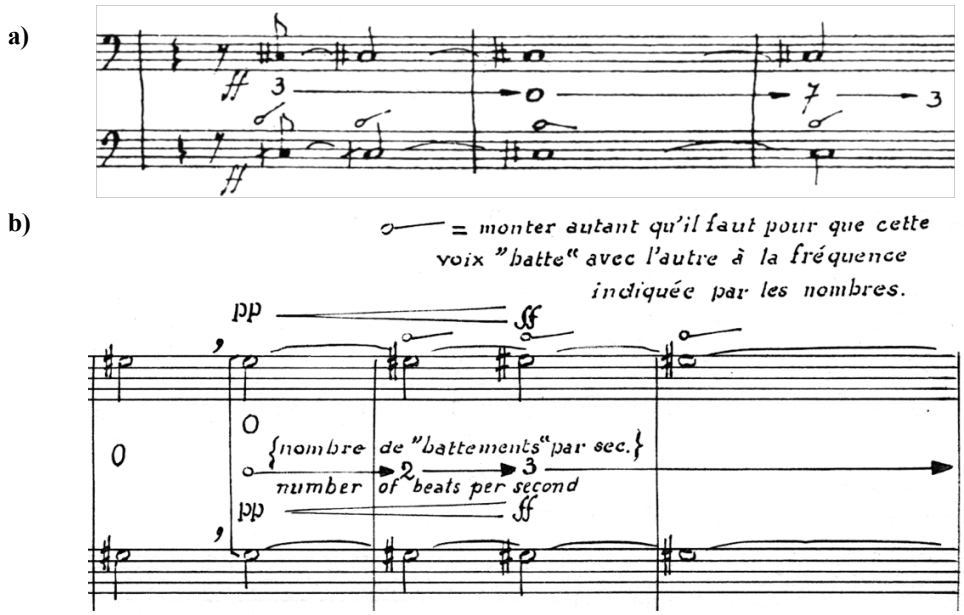


***Figure 3.15***. Use of beating effects by Xenakis. **a)** Excerpt of a solo piece for violoncello. Source: *Nomos alpha*, meas. 5-7 (Xenakis, 1967) – © Boosey & Hawkes. **b)** Excerpt of a piece for mixed choir. Source: *Nuits*, meas. 130-2 (Xenakis, 1968) – © Éd. Salabert.

While the two previous examples in Fig. 3.15 show Xenakis generally using instruments or voices in which he can vary the number of beats and work on different gradations (progressively increasing and decreasing), the quantity is fixed with the SIX-XEN and determined by the construction itself. There is no need to indicate a specific notation of the effect because it occurs throughout, and excerpts of «*Métaux*» depict different ways with which Xenakis highlighted this characteristic of his acoustic instrument through macro composition. For instance, the beginning of the movement shows the effect being produced by the same bar played in the different sixxens (Fig. 3.16a) and this is gradually developed in more complex beating structures throughout the piece (Fig. 3.16b and c), representing a kind of compositional discourse about beating effects, waveforms and differences (further detailed in Chapter 5).

[57] The examples here selected even attest a sort of reminiscence of the experiments Xenakis realized in 1953, because they show this interest to produce the beating effects by distancing and/or nearing two notes.

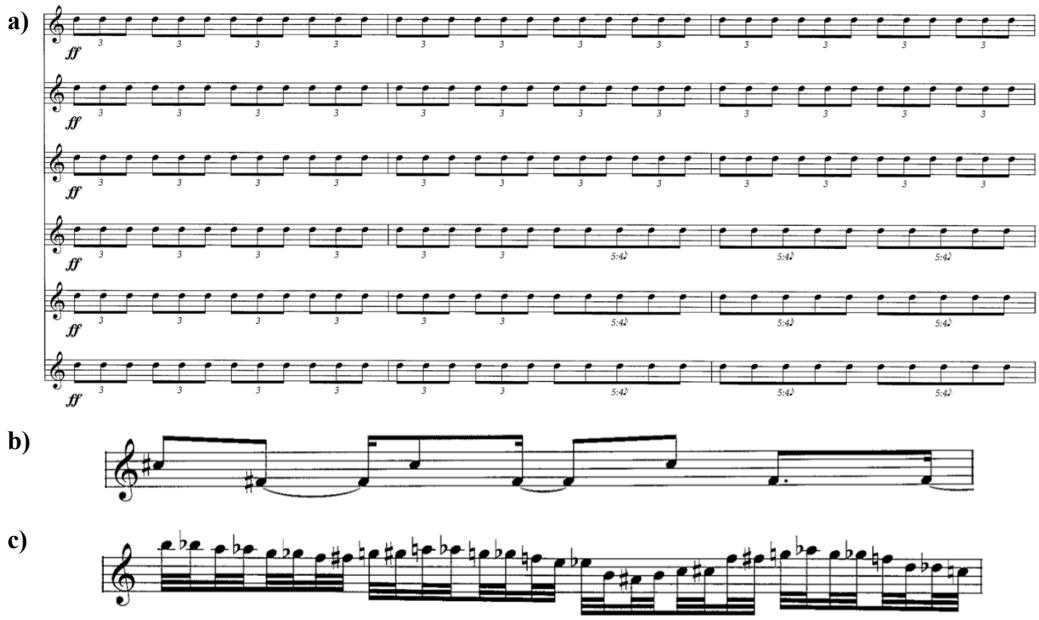


***Figure 3.16***. Different textures with which Xenakis treated the beating effects produced by a Sixxen in *Pléïades*. **a)** Use of a same note by each sixxen with different rhythms. Source: *Pléïades*, «*Métaux*», meas. 1-3 (Xenakis, 2013) – © Éd. Salabert. **b)** Use of two notes in unison by players B, C, D, E and F. Source: *Pléïades*, «*Métaux*», meas. 35 (Xenakis, 2013) – © Éd. Salabert. **c)** Fast melodic excerpt in unison with chromatic passages. Source: *Pléïades*, «*Métaux*», meas. 84 (Xenakis, 2013) – © Éd. Salabert.

As shown here, the SIX-XEN is essentially an acoustic instrument of beating effects and it is by its requisite characteristics that Xenakis created the total correlation with an effect with which he was vastly interested and had applied to many other pieces: the glissando. This is another effect that has a great presence in his production and could also correlate with the instrument, as it will be now discussed.

### 3.3.3 Glissandi and the diagonal continuity in the spectrum

> *l'image la plus simple de la continuité en musique, c'est le son tenu.*
> *Puis celle du changement imperceptible, c'est le glissando.*
> (Xenakis, 1994, p. 93).

It is interesting to perceive that, even if the glissando is never directly mentioned in the different descriptions and explanations by Xenakis, the SIX-XEN has a direct correlation to this effect that occurs in many of his works. The diagonal change in the frequency parameters can be produced as a continuous glissando or as a discrete glissando. The continuity is done by fretless string instruments or those with sliding mechanisms such as the trombone, the ondes martenot and timpani. The discrete glissando occurs when tones can be distinguished when sliding, a consequence of the discontinuity caused because the frequencies are fixed at the construction not allowing intermediary intervals smaller than a semitone nor the continuous passage between notes, such as occurs with the piano, organ or percussion keyboards. In both cases the notation could be indicated similarly, but a discrete

glissando may be indicated as diatonic or chromatic (Fig. 3.17). Different gestures could allow such an effect in the case of percussion keyboards by continuously sliding the mallet or by quickly playing one note after the other. The SIX-XEN can obviously produce both discrete glissandi types but the effect is still reinforced by the small distances between the frequencies that characterize the intervals between different metallic bars.

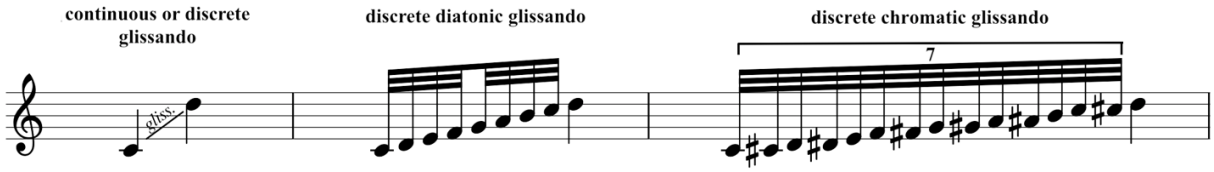


***Figure 3.17***. General notation to indicate glissando, being it continuous, discrete diatonic or discrete chromatic.

The use of glissandi by Xenakis is recurrent in his early pieces, and *Metastaseis* and *Pipthoprakta* are great examples of this intense presence of glissandi in his compositional approach. The use of glissandi is structural in both pieces and could be highlighted in many passages (Fig. 3.18), a notion of which has been addressed and analyzed by many scholars. Examples of glissandi in his works are countless as this compositional technique is characteristic of his style and recurrent throughout almost all his career.

**a)** **b)**

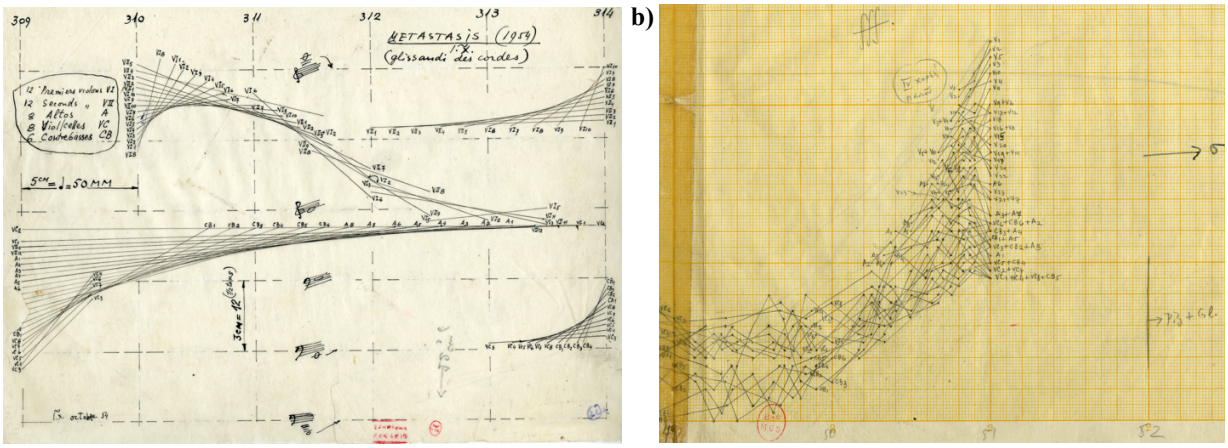


***Figure 3.18***. Presence of glissandi effects in Iannis Xenakis' early compositions. **a)** Presence of glissandi in the bow instruments of *Metastaseis* (1953-1954). Source: © Famille I Xenakis DR (OM 1-4, p. 28). **b)** Presence of glissandi in the bow instruments of *Pithoprakta* (1955-1956). Source: © Famille I Xenakis DR (OM 1-13, p. 1-1).

From this initial marked presence of the use of glissandi, Xenakis continued developing techniques and tools to address this kind of sonority in different structures, textures, and timbre associations. Regardless of instrumentation or ensemble size, the glissando effect was cemented in his composition even as its presence progressively decreased over time. For Harley (2004) the effect

of glissando is even what would connect his first and last orchestral pieces[58]. In the context of his production, Xenakis clearly used glissando effects in various electroacoustic pieces such as *Antikhthon* (1971), *Persepolis* (1971), *Voyage absolu des Unari vers Andromède* (1989). Hofmann (2015), who compared his electroacoustic production with the orchestral pieces of the respective time, highlighted how the glissando was a fundamental sonority of Xenakis' work in the 1970s. He also gleaned an interesting perspective when comparing the use of glissando by the composer, concluding that:

> By examining the most famous Xenakian sonic entity, the glissando, one can ascertain a complementary development in the two relevant domains: Dominating in the instrumental works of the 1950s, it becomes increasingly rare up to the 1980s and 1990s. Vice versa with the electroacoustic compositions: From rare appearances in GRM times, it gains independence in the 1970s and hits its peak in UPIC works of the 1980s. Both curves meet in the Polytope era of the 1970s – a fact that may be significant for the largest similarities the orchestral and the electroacoustic domain in that time. (Hofmann, 2015, p. 28).

For Xenakis the importance of the glissando can be seen in his architectural production. In 1980, when asked by Varga if the lines of the Philips pavilion could be considered as a sort of glissando in space, the composer answered:

> Of course it is. What is a straight line in two-dimensional space? The continuous change of one dimension compared to the other. The same happens in the pitch versus time domain: the straight line is the continuous change of pitch versus time. The difference between physical and musical space is that the former is homogeneous: both dimensions are lengths and distances. In music, however, the two dimensions, pitch and time, are alien in nature from one another and are connected only by their ordering structure. The musicians of ancient times, Guido d'Arezzo and others, weren't conscious of that, and neither are those living today. I've thought a lot about it and can see this question clearly. (Varga, 1996, p. 70).

The importance of the glissando was crucial in Xenakis' theoretical and practical approaches in terms of his instrumental, vocal, electroacoustic music or even architectural achievements. It is by consequence necessary to note that the SIX-XEN carries typical elements of a glissando effect within its conception and its practical realization. In the core of its sonority is the inherent mark of what made *Metastaseis*, the Philips Pavilion and many others of Xenakis' achievements such remarkable works. It is true that, in the description of the instrument, he asked that the instrument should be constructed presenting some variable distances between the "tone centres"[59], but it is also true that if they are sequentially played, the six frequencies that have to surround these same "tone centres" creates the typical phenomenon of a discrete glissando. Therefore, because there are many notes

[58] As he stated describing *Sea-Change* (1997), "The long slow glissando gesture, finally converging to a unison, certainly brings to mind *Metastaseis,* linking this final orchestral effort with the composer's first. The evocation of the rolling swells of the sea can also be sensed, particularly in light of the title and the numerous earlier scores owing some sort of inspiration to the Mediterranean." (Harley, 2004, p. 227).

[59] As mentioned by the composer himself: "I would have the nineteen prefixed central pitches spread quite wide apart, and the intervals would be produced with a 'sieve' so that they wouldn't be the same everywhere. In this way you get a kind of aura around a note played by the six percussionists. [underline added]" (Varga, 1996, p. 180).

potentially situated in a very close disposition and creating a sort of continuous gradation from low to high, the effect can be perceived softly or strongly depending on the frequency characteristics of the prototype constructed. Notes of different sixxens played together cause clusters that also produce a beating effect, but if considered in a melodic sequence it could clearly be considered a sort of glissando that also produces beating effects due to the interactions of the resonances.

The glissando effect is also reinforced by a second layer of structural treatment produced by Xenakis, being present in terms of the composition of melodic materials found in *Pléïades*. In the graphic score of the manuscripts of «*Métaux*», the glissando effect appears by the use of a sequence of dots that emerge as straight ascending or descending lines (further detailed as micro-chromatic structures in Chapter 5). This presented a typical sequence of neighboring notes that resulted in different visual presentations in the subsequent notations found in SIX-XEN, being a diatonic passage in the 1979 version and a chromatic passage in the 1988 and 2013 versions (Fig. 3.19). Even if the presentation is visually different in each version, the sound result is the same: a glissando phenomenon intrinsically present in the constitution of the instrument, bringing it to the center of the composer's most characteristic approaches.

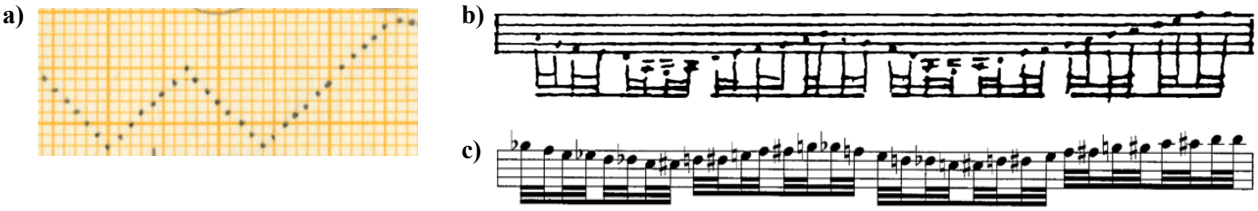


***Figure 3.19***. Written aspect of the glissando effect in «*Métaux*». **a)** Excerpt of the manuscript showing straight lines as the initial treatment of the glissandi. Source: © Famille I Xenakis DR (OM 28-17, p. 4). **b)** 1979 version showing a notation as a diatonic passage. Source: *Pléïades*, «*Métaux*», meas. 73 (Xenakis, 1979) – © Éd. Salabert. **c)** 2013 version showing a notation as a chromatic passage. Source: *Pléïades*, «*Métaux*», meas. 73 (Xenakis, 2013) – © Éd. Salabert.

One composer that captured this intrinsic glissando in the acoustic characteristics of the SIX-XEN and used the effect as the main compositional material of a piece was Rozalie Hirs. In the movement «*morning star*» of *Venus* (2010), she treated the six voices as alternating ascending or descending chromatic lines (Fig. 3.20), creating a continuous flux by constant repetition that is reinforced by the electronics that surround the audience. As a result, this entire movement creates the effect that relates to the Shepard–Risset glissando, an infinite glissando that seems to continuously ascend or descend.

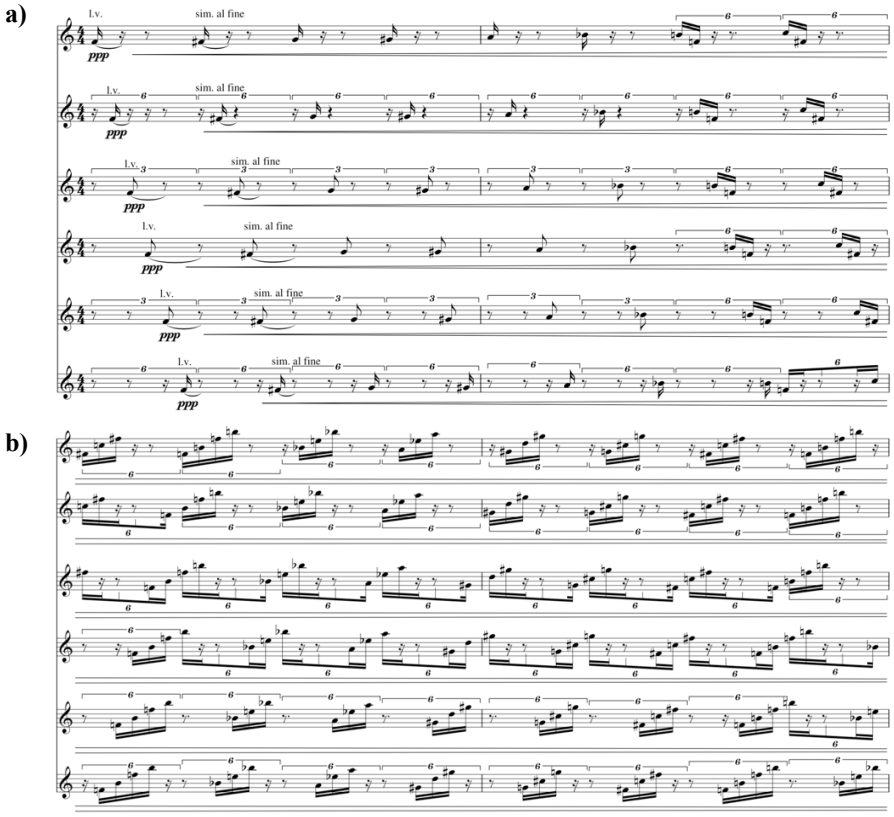


***Figure 3.20***. Aspects of the notation in *Venus* «*morning star*» (2010) by Rozalie Hirs creating the effect of an infinite glissando with electronics. **a)** Alternate voices creating the patterns to an ascendant glissando. Source: *Venus*, «*morning star*», meas. 1-2 (Hirs, 2010) – © Muziek Centrum Nederland. **b)** Alternate voices creating the patterns to a descendant glissando. Source: *Venus*, «*morning star*», meas. 62-63 (Hirs, 2010) – © Muziek Centrum Nederland.

Hirs created a masterpiece using the sonority that Xenakis had used the most in his compositions, even if he never explicitly wrote it as being part of the SIX-XEN. This instrument had an intrinsic continuity in the frequency parameters, representing yet another tool that Xenakis developed to improve his treatment of glissandi aspects. Therefore, the instrument can reflect one of the stronger Xenakian traits and marks.

### 3.3.4 Multiplicities, variations and unfaithful repetitions

An extensive part of the introduction of *Pléïades* is dedicated to presenting important elements for Xenakis in terms of its macrocompositional organization of rhythms. He addressed the question of variation as unfaithful repetitions and, as he stated, "The sole source of this polyrhythm is the idea of periodicity, repetition, duplication, recurrence, copy, faithfulness, pseudo-faithfulness, unfaithfulness." (Xenakis, 1979, p. i). He then described the process in which a rhythmic idea is varied and even correlated with other aspects of the cosmos[60], demonstrating that the main interest of

[60] As it is perceptible when he stated that "Stronger variations, even more complex, or often the same, due to the chance of a particular stochastic distribution, leads to total arrhythmia, to a massive knowledge of the event, to notions of clouds, nebulae, galaxies of dusty blows organized by the rhythm." In the original text: "De plus fortes variations, encore plus

this piece was the subtle differences that can manifest recurrent multiplicities and unfaithful repetitions. These aspects also mainly characterized the instrument that Xenakis had specifically created for this occasion, being a collection of unfaithful repetitions in its essence.

The composer consciously addressed this concept when he stated: "I mentioned in passing, and in connection with repetitions, the word unfaithful. Yes, a reproduction can be thought identical to the original, but reality never reproduces an identity. There is variation anyway, if only because it happens in another time or place."[61] (Xenakis, 1994, p. 92). In the case of the SIX-XEN, the recurrent multiplicities are occurring in the frequency parameters[62] and the composer is attempting to extend this "reality of unfaithful repetitions" in the manifestation of the 19 "pitches" that ultimately need to be configured by a manifestation of six different variations of the same entity[63]. This concept about unfaithful recurrence is presented in some of his main texts and depict a more profound meaning in his thoughts and personal intents, as when he stated that:

> The principle of repetition, of more or less faithful duplication is general; it is an integral part of musical composition on all levels, from the microscopic to the macroscopic. At the microcosmic level, for example, not only does the ear perceive faithful repetitions, but it also registers their density in the form of the pitch. At the macroscopic level, forms such as the canon, the variation, etc., are also subject to this principle of more or less faithful renewal. Wherever it occurs, every event is in some respect unique, isolable and impossible to reproduce exactly because of the losses, even very small ones (due only to the time elapsed between the original and the copy), which affect the fidelity of any reproduction. However, with sufficient "approximation", the two versions can "appear" identical (within the approximation) and form equivalence classes in which the elements remain generally separable, while being likely to merge in certain particular cases. The absence of repetition in the pressure versus time curve is perceived as noise, and therefore as an extreme entity.[64]

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complexe, ou ce qui revient souvent au même, dues au hasard d'une distribution stochastique particulière, conduit à l'arythmie totale, à une connaissance massique de l'événement, à des notions de nuages, nébuleuses, galaxies de poussières de coups organisés par le rythme." (Xenakis, 1979, p. i).

[61] "J'ai mentionné en passant, et à propos des répétitions, le mot infidèle. Oui, une reproduction peut être pensée identique à l'originale, mais la réalité ne reproduit jamais une identité. Il y a variation de toute façon, ne serait-ce que parce que ça se passe en un autre moment ou en un autre endroit." (Xenakis, 1994, p. 92)

[62] The correlations potentially present in this parameter are directly mentioned when he stated that "who says causality implies rules, that is to say repetition, because there are no rules without repetition. And repetition means periodicity, which brings us back to our field of sounds, but at the lower level of the one we started from, since we are now at the level of one of the characteristics of sound, the pitch or the frequency, which is only the repetition of a waveform in time." (Xenakis, 1994, p. 91). As originally presented: "qui dit causalité implique règles, c'est-à-dire répétition, car il n'y a pas de règles sans répétition. Et répétition veut dire périodicité, ce qui nous ramène dans notre champ des sons, mais à l'étage inférieur de celui d'où on est parti puisque maintenant nous sommes au niveau d'une des caractéristiques du son, la hauteur ou la fréquence, qui n'est que la répétition d'une forme d'onde dans le temps." (Xenakis, 1994, p. 91).

[63] "This means that for a given pitch out of the 19 ones and for any of the six SIXXENS, the other 5 corresponding ones should not form unisons, by no means. The deviation could be slight but should still be noticeable." (Iannis Xenakis, mail to Ruud Wiener, October 29, 1982).

[64] "Le principe de répétition, de la duplication plus ou moins fidèle est général ; il fait partie intégrante de la composition musicale sur tous les plans, du microscopique au macroscopique. Au niveau microcospique, par exemple, non seulement l'oreille perçoit les répétitions fidèles, mais elle enregistre également leur densité sous la forme de la hauteur du son. Au niveau macroscopique, des formes telles que le canon, la variation, etc., sont également soumises à ce principe de renouvellement plus ou moins fidèle. Où qu'il se produise, tout évènement est à certains égards unique, isolable et impossible à reproduire exactement en raison des pertes, même très faibles (ne seraient-elles dues qu'au temps écoulé entre l'original et la copie), qui affectent la fidélité d'une éventuelle reproduction. Cependant, avec une « approximation » suffisante, les deux versions peuvent « paraître » identiques (dans le cadre de l'approximation) et former des classes d'équivalence dans lesquelles les éléments restent généralement séparables, tout en étant susceptibles de se fondre dans

(Xenakis, 1994, p. 25).

It can be perceived here that the micro and macro levels are directly mentioned by the composer, showing that the unfaithful repetitions are present at those layers and by consequence could also receive some level of interference by a composer. Xenakis is clearly pointing to a potential way to consider a fundamental characteristic of the SIX-XEN as microstructural elements and to understand its potential connections with macrostructures. This correlation is important to understand a significant part of *Pléïades* but also to be object of an analytical perspective (as detailed in Chapter 5 and 6), but in this instance, some parallels are traced between the concept surrounding his instrument as correlated to other pieces and the context in which Xenakis developed such thinking and practical approaches.

Firstly, in terms of microstructure, the requirement that differentiates the 19 bars unfaithfully reproduced six times was a clear way that Xenakis developed to interfere in this microlayer establishing sonorities that are based on superposed multiplicities, as instantaneous and amalgamated unfaithful repetitions. As he stated, the ear not only perceives the hearing results but "also registers their density in the form of the pitch" (Xenakis, 1994, p. 25), so he attempted to show a contour that could still clearly characterize melodic passages. In this context, he appeared to have proposed something that could be understood with a specific position from low to high register but also could be manifested as something other than a unique determined pitch, of which he sometimes called an "aura"[65]. As he additionally mentioned, at the opposite spectrum of the "faithful repetitions perceived as density in the form of the pitch", there is the noise ("absence of repetition in the pressure versus time curve" as mentioned above–Xenakis, 1994, p. 25). The SIX-XEN could thus be regarded as an instrument with which Xenakis was clearly seeking an interstice between instruments of defined and undefined pitch, situating it in between these two sonic possibilities (this will be an important aspect when treating the analysis of *Pléïades*).

Secondly, in terms of macrostructure, it is important to point and define here a specific musical result that interested Xenakis from the second half of the 1970s until the first half of the 1980s by being a structure and a sonic manifestation of unfaithful repetitions, also called the sound halo. In the introduction of *Nekuia* (1981), Xenakis summarized this kind of texture when affirming that "On the technique level there is, for example, a discussion and a treatment of the non-octaviating scales in relation to my 'sieve' theory with, in addition, multiplicities of shifted melodic patte[r]ns, like a kind of artificial reverberation [underline added]." (Xenakis, 1981, p. ii). He then briefly but also clearly defined the technique as repetition of varying melodic patterns but also described part of the hearing

certains cas particuliers. L'absence de répétition dans la courbe de pression en fonction du temps est perçue comme bruit, et par conséquent comme une entité extrême." (Xenakis, 1994, p. 25).

[65] As he expressed about it in a 1989 interview with Varga (1996, p. 180).

result.

The term sound halo was not initially coined by Xenakis but by Solomos (1996), who presented a historical and analytical overview of the composer's production, aesthetics and approaches. The author then summarily defined the sound halo as a kind of heterophonic structure created by similar melodic materials that are constantly shifted by their rhythmic presentations. This definition therefore refers to a compositional technique that Xenakis had developed during the late 1970s, second half of the 1970s as prefigured in *Retours-Windungen* (1976) with an introduction in which the twelve cellos develop a heterophonic texture of melodic lines characterized by only three notes, and truly manifested for the first time as a musical material fully developed in 1977 with *Jonchaies*[66]. In this orchestral piece, the excerpt that contains this first complete formalization of the technique is presented in the introduction and, as Solomos (1996, p. 85) pointed out, the strings play ascending and descending passages on a single scale in heterophony for four minutes[67]. The next pieces in which the composer developed this technique were *Ikhoor* for violin, viola and violoncello, and *Pléïades*, both from 1978. The technique was present in the composer's production until the mid 1980s with pieces such as *Palimpsest* (1979), *Aïs* (1980), *Serment-Orkos* (1981) and *Nekuia* (1981) featuring the technique's applications and representing its developments. As indicated by Solomos (1996), Xenakis' *Chant des soleils* (1983) and *Lichens* (1983) are believed to be the last pieces in which he applied this technique[68].

In the context of this production period, it is perceptible that *Pléïades*, one of the first pieces in which he used the technique, established a noteworthy correlation between the acoustic instrument he created and the compositional technique he was then developing and refining, occupying a prominent place in the midst of these works. In *Pléïades*, this technique is seen in many passages (including instances in *Retours-Windungen* and *Jonchaies*), being a strong textural material that essentially defines and structures in «*Claviers*» and «*Métaux*» (as detailed with examples shown in Chapter 6).

This correlation between the micro and macrostructures, the constitution of the acoustic instrument's sonic characteristics and the musical structures in which it will be inserted is significant. This demonstrates once more that the Xenakian instrument mirrored both the primary approaches the

[66] As Solomos (1996, p. 85) stated "The sound halos make their real entrance with the first major part of *Jonchaies*". Original text: "Les halos sonores font leur véritable entrée avec la première grande partie de *Jonchaies*" (Solomos, 1996, p. 85).

[67] As it will later be better addressed this scale is the same used in *Pléïades*, showing the correlation of both pieces in terms of scalar materials but also of the sound halo as a specific textural treatment. The scale used in both pieces is based on a mathematical tool called Sieve theory. To develop it, Xenakis inserted part of a scale that characterized a set of gamelan instruments he heard and recorded in a trip to Indonesia in 1972-1973 (see more analytical details in Chapter 5, 6 and 7, as well as historical ones in Chapter 1).

[68] Before these two last pieces, Xenakis still used the sound halo technique in *Shaar* (1982), *Tetras* (1983), *Khal Perr* (1983) but it started to be presented just in brief parts and excerpts.

composer was then stylistically developing and the sonorities he was then trying to achieve as his predominant signature. This new step in his career, the decision to create a new acoustic instrument, was therefore fundamentally established in total accordance with his compositional thinking and practices. In this light, the openness of the SIX-XEN takes on a new meaning; by allowing the instrument to be constructed in a variety of ways, the composer created possibilities for the concept of this instrument itself to be permeated by multiple practical characterizations and diverse sound entities. The numerous prototypes of various Sixxens that have been (and will continue to be) built are unfaithful repetitions of the initial idea of SIX-XEN. The fact that the Xenakian instrument is mainly an open-ended concept of an object intrinsically (microstructurally speaking) constituted by unfaithful repetitions that could be constructed as different prototypes (or "unfaithful" configurations from one to the other) would represent just a continuation of his musical approach of using sound halo, polyrhythms and other complex macrostructures but also of his personal point-of-view about life and existence. It is thus for Xenakis the result of something fundamental, as an existential requirement and an indissoluble necessity because, as he stated, "the periodicity is an essence, the very essence, corollary of existence, because how can we imagine an event, a something in the eternity of space and time that is unique and finite? / We need repetition, even if it is unfaithful!"[69] (Xenakis, 1994, p. 91). This is not completely detached from the philosophical discussion that occurred during the period with Xenakis' contemporaries in other domains. Quite the opposite[70], as the composer himself expressed during an interview in 1986, "As I see it, music is a domain where the most profound questions of philosophy, thought, behavior, and the theory of the universe ought to pose themselves to the composer." (Lohner, 1986, p. 54). This aspect of the "theory of the universe" posed to the composer appears to strongly emerge in Xenakis' thinking associating music, instruments, aesthetic values, micro and macrostructures (whether musical or not), society and life as immanent manifestations of the unfaithful repetitions. As he stated:

> But the infidelity of the reproduction, of the recurrence in the music, is synonymous of life, of aesthetic value of a sound, of a music. This is what the attempts of electronic instruments of the pre-war period have shown, this is what the electronic music of the tape recorder era has shown, this is what the music made on computer has shown. Infidelity is the birth of the line from the point, its archetype. It is thus the change which confirms the being-point. It is the synthesis, the amalgam of Parmenides and Heraclitus. To occupy the eternity of the space

[69] "Or la périodicité est une essence, l'essence même, corollaire de l'existence, car comment imaginer un événement, un quelque chose dans l'éternité de l'espace et du temps qui soit unique et fini ? / Il nous faut la répétition, même infidèle !" (Xenakis, 1994, p. 91).

[70] In this sense, Gilles Deleuze and Jacques Derrida, both contemporary of Xenakis and all having some common friends (such as Olivier Revault d'Allonnes), seem to had enormously contribute in this perspective of Xenakis' thinking and by consequence practice (as here put in evidence). Xenakis' statements about the subject could be correlate with some aspects of the most important publications of both philosophers, *L'écriture et la différence* (Derrida, 1967) and *Différence et répétition* (Deleuze, 1968), even if both were proposing different perspectives in this matter as brilliantly pointed by Cisney (2018). This subject deserves a whole discussion and would be the main objective of a complete research, for instance the discussion here will however focus only on Xenakis' point of view. Situating the composer amidst the diversity of philosophical currents and trends will certainly receive greater attention in future discussions.

> and the time, it is necessary the recurrence which is unfaithful. The music could be perceived under this rich angle, entirely, since the hundred thousandth of second, the sample, until the macroform of ten minutes [underline added].[71] (Xenakis, 1994, p. 92).

For Xenakis, a musical object (in the present discussion a Sixxen e.g.), a musical discourse (as the sound halo e.g.), a structure (as a polyrhythm, or a scale) and an intrinsic constituent (a frequency, a waveform), are micro and macrolayers that remain different things while being characterized by principles of variation. They mirror the other by sharing the multiplicities that the principle of unfaithful repetition allows, each one continuing to exist with its own characteristics. All factors combined would be a representation of the existence in itself, a manifestation of total rules (as himself stated "there are no rules without repetition"–Xenakis, 1994, p. 91), a reproduction of what is "naturally" observable in the physical, chemical, biological, socio-cultural and psychological attributes. The instruments and research of typical musical objects of the 20th century that Xenakis had addressed in the text above mentioned (Xenakis, 1994, p. 92) clearly attest that his own acoustic instrument is situated in a step to "occupy the eternity of space and time" with the recurrence of infidelities "from the hundred thousandth of second, the sample, to the macroform of ten minutes", being thus a "synonym of life".

[71] "Mais l'infidélité de la reproduction, de la récurrence dans la musique, est synonyme de vie, de valeur esthétique d'un son, d'une musique. C'est ce qu'ont montré les tentatives d'instruments électroniques d'avant-guerre, c'est ce qu'ont démontré les musiques électroniques de l'ère du magnétophone, c'est ce que démontrent les musiques faites sur ordinateur. L'infidélité, c'est la naissance de la ligne à partir du point, son archétype. C'est donc le changement qui confirme l'être-point. C'est la synthèse, l'amalgame de Parménide et de Héraclite. Pour occuper l'éternité de l'espace et du temps, il faut la récurrence qui est infidèle. La musique pourrait être perçue sous cet angle richissime, entièrement, depuis le cent millième de seconde, l'échantillon, jusqu'à la macroforme de dizaine de minutes." (Xenakis, 1994, p. 92).

# Chapter 4. Xenakis' music for Sixxen after *Pléïades*

The previous discussion took a more comparative approach, showing a certain continuity in Xenakis' research of sonic and musical qualities. The present chapter will then address a different perspective: the Xenakian production in which a Sixxen or part of it was used, focusing on the post-*Pléïades* pieces or spectacles that the composer produced. The present chapter is a complement to the earlier discussion addressed, because how Xenakis used the instrument and even *Pléïades* as part of new performances dynamically increased how the instrument could be perceived and understood, always from the perspective of its own creator. Even in unfinished pieces, the attempt to use the SIX-XEN in a new context exposed some contradictions, solution findings, and also led to a completely new development influenced by the composer himself.

Xenakis used his own instrument in one new piece and in diverse situations and spectacles. As will be discussed, the instrument was not an exclusive requirement of *Pléïades*. On the contrary, the instrument was implied in a new score, *Idmen A B* in 1985, and one of his total spectacles called *Taurhiphanie* in 1987, having been intended for many other projects that were unfinished (including what could have been Xenakis' last ballet and only self-choreography). Thus, the primary focus of the discussion below will be the multiple aspects of his personal thinking on SIX-XEN by observing his practical and experimental approach in different situations.

## 4.1 The SIX-XEN in the *Mexico* and *Athens Polytopes*: only unfinished possibilities

The first time that Xenakis would have potentially implied the use of a Sixxen in a new musical context may relate to a specific *Polytope*. As summarily indicated by Sterken (2001, p. 267), "the Polytopes are typical for the new art forms that emerged after the Second World War, such as happenings, performances, installations and environments. A common element in these artistic expressions is a general tendency towards dematerialization of the art object and the wish to blur the distinction between the space of the spectator and that of the art work itself." Through this approach, the presence of *Pléïades* within a specific spectacle showed that the composer had a desire to apply his acoustic instrument once more, even if he did not create a new score for specific situations. These individual events deserve a specific approach to discuss their characteristics, importance and contributions. Thus, after a brief introduction about the *Polytopes*, the *Mexico Polytope* and the *Athens Polytope* will be addressed specifically because both could had implicated the use of the SIX-XEN if accomplished.

Xenakis realized several facets of countless multidisciplinary projects that would connect: music, light and laser projections; performers including musicians, actors and others; and various other elements including tanks, airplanes, helicopters and others that coordinated in specific spaces[1]. The composer stated in a 1980 interview with Varga (1996, p. 112) that this type of project originated as a way to accomplish an artistic interest to stimulate view and hearing simultaneously, and that by reproducing natural phenomena on a smaller scale, Xenakis brought to the forefront an examination of the construction of perception and its implication in the reality of human senses and biological structures as mechanisms defining the environment and the behavior in determined spaces[2]. He typically referred to this kind of spectacle as *Polytope*, from the fusion of ancient Greek terms *poly* (many or numerous) and *topos* (place, location or site). The name indicates the importance of space in these spectacles and how the architectural elements influenced the design of where the perceptive events occurred. As Lovelace (2010, p. 70) stated, "Just as he had initially used graphic geometries to visualize sound in a new way, he now reversed the equation and used music's formal strategies to craft shifting optical architectures." Xenakis exercised this new perspective in his compositions including the *Montreal Polytope* (1967), *Persepolis Polytope* (1971), *Cluny Polytope* (1972), *Diatope* (1978) and *Mycenae Polytope* (1978). Some works were unfortunately unfinished and unexecuted, as the conceptual and very futuristic *World Polytope* (1974), the *Mexico Polytope* (1978-1981) and *Athens Polytope* (1985); see more information in Table 4-1.

[1] The production of a multidimensional artistic object in which a dialog between architecture, music, lights and transformation of space as an event was not new for Xenakis when he created the first polytope (*Montreal Polytope*, 1967). The Philips Pavilion (1958) could be an example of this kind of approach in the young composer and solid architecture's career. In this project his contribution is undoubtedly fundamental and the proposition in itself also stimulated his imaginary forever. Even with many critics directed to aesthetic choices by Le Corbusier in this accomplishment, Xenakis was responsible to integrate a research in sound, light and architecture that would permeate long years of his production, as it is the case fundamentally represented by the different *Polytopes*.

[2] As the composer stated, *Polytopes* are "experiments with novel ways of using sound and light. It's an attempt to develop a new form of art with light and sound. [...] / The starting point is my desire to live – that is to do, to create something, with my hands and with my head. In the case of the *Polytopes* I was attracted by the idea of repeating on a lower level what Nature carries out on a grand scale. The notion of Nature covers not only the earth but also the universe. When we look from space at the earth at night, we see that the globe is lit by artificial light, which didn't exist a century ago. You see what I mean? And this is only the beginning. If the kind of development we have seen recently continues the possibilities of mankind will multiply and all that novelty will also enrich art. One can realize more and more interesting and complex things – artists will possess immense power" (Varga, 1996, pp. 112-113).

***Table 4-1***. Accomplished and unfinished projects of *Polytopes* with a summary of their characteristics.

| Title (year) – duration, local<br>Date of premiere | Details | Acousmatic pieces<br>Acoustic pieces | Technical demands in light (a) and sound (b) |
|---|---|---|---|
| **A) Accomplished projects** | | | |
| ***Montreal Polytope*** (1967) – 6'<br>French Pavilion – Expo 67 (Canada)<br>**Premiere:** 26 April 1967<br>Presented until 2 October 1967 | ↻ ■ | *Polytope* *<br>none | **a)** 800 white flashing and 400 colored (red, yellow, green, blue) lights, coordinate through film-perforation system<br>**b)** quadriphonic diffusion of recorded music by 4 orchestras of 14 musicians |
| ***Persepolis Polytope*** (1971) – ≅ 67'<br>Ruins of Persepolis during the overture of the Shiraz Festival (Iran)<br>**Premiere:** 26 August 1971 | ▼ | *Diamorphoses*<br>*Persépolis* *<br>none | **a)** 2 laser beams, 6 military searchlights, 3 sets of 12 spotlights each (illuminating the ruins), 20 fire basins, 150 torch-bearing children, 5 large oil fires<br>**b)** 60 loudspeakers disposed in 3 circles to diffusion of the octophonic piece *Persépolis* |
| ***Cluny Polytope*** (1972) – 24'<br>Roman Ruins of the Museum of Cluny (France)<br>**Premiere:** 17 October 1972<br>Presented until 27 January 1974 | ↻ ■ | *Polytope de Cluny* * (announced by Xenakis as *ST/cosGauss* and *Bohor II* at the period)<br>none | **a)** 600 xenon discharge tubes, 3 laser beams (red, green and blue) refracted by 400 adjustable mirrors, coordinate through computer programing with digital instructions sent by multitrack magnetic tape<br>**b)** heptaphonic piece diffused by 12 loudspeakers |
| ***Diatope*** (1978) – 47'<br>*Centre Georges Pompidou* (France)<br>**Premiere:** 14 June 1978<br>Presented until 31 December 1978<br>Bonn (Germany): May/October 1979 | ↻ ■ | *La Légende d'Eer* *<br>none | **a)** 1680 strobe lights, 4 lasers beams guided by 400 adjustable mirrors and numerous prisms; integrally computer controlled; development of the architecture surrounding the *Diatope*<br>**b)** acousmatic piece of seven tracks distributed over 11 loudspeakers |
| ***Mycenae Polytope*** (1978) – ≅ 180'<br>Ruins of Mycenae Acropolis and mounts Zara and Elie (Greece)<br>**Premiere:** 2 September 1978<br>Presented until 5 September 1978 | ↻ ▼ | *Mycenae alpha* *<br>*À Colonne*, *À Helene*, *Oresteïa* suite, *Persephassa*, *Psappha* | **a)** 12 searchlights, torch-bearing people and soldiers, 200 belled and light-bedecked (with diodes) goats, projections on wall of the ruins of Mycenae, gush of flames, fireworks, two looping videos<br>**b)** the first electroacoustic piece integrally composed on UPIC is divided alternating with the acoustic pieces ordered here by appearance sequence, 2 reciters reading Homer |
| **B) Unfinished projects** | | | |
| ***World Polytope*** (1974) | ▼ | not specified | **a)** association of different *Polytopes* in cities all around the globe ("USA, URSS, France, Germany, England, Japan, ..."), laser beams, flashlights, and devices to integrate more countries<br>**b)** electroacoustic sounds |
| ***Mexico Polytope*** (1978-1981)<br>Teotihuacan (Mexico)<br>The premiere was planned to the end 1981 | ▼ | mentioned as a new piece<br>*Persephassa*<br>*Pléïades* | **a)** searchlights, thousands of children bearing colored paper, fire basins, torch-bearing groups, large oil fires, laser beams, military searchlights, fireworks<br>**b)** processions of children, playing flutes, whistles and percussion instruments (teponaztli and huehuetl) |
| ***Athens Polytope*** (1984-1985) ≅ 85'<br>Many locations and the hills of Greece capitol<br>The premiere was planned to 21 June 1985 | ▼ | not mentioned<br>*Khal Perr*, *Persephassa,*<br>*Pléïades*, *Psappha* | **a)** 17 searchlights, laser beams, children bearing torches, light sources, groups of 500 people bearing torches, 33 helicopters, thousands of pigeons bearing light diodes, 150 hot air balloons, military artillery, fireworks at the Acropolis, Pnyx, Lycabettus, Hymettus, Aigaleo and Tourkovounia<br>**b)** all the bells and alarm sirens of the city, car horns, 3 percussion groups |

**Legend:** ↻ – The polytope was presented repeatedly  * – Piece exclusively composed for the occasion
■ – Indoor spectacle  ▼ – Open-air spectacle

Musically speaking, the *Polytopes* presented mostly acousmatic but rarely instrumental pieces, with a newly composed electroacoustic piece for each specific occasion. The only exception was the *Mycenae Polytope* which presented acoustic pieces (including *Psappha* and *Persephassa* for percussion – this polytope was an initial project in which Sylvio Gualda's students collaborated to perform Xenakis' compositions[3]). This polytope[4], which had the longest duration, was an almost summarized representation of his work, depicting for the first time an extensive palette of his artistic production in terms of electroacoustic and instrumental pieces. It was anticipated then that the next polytopes would take same approach, uniting instrumental and acousmatic pieces[5]. Thus, the composer produced sketches of the *Mexico Polytope* and the *Athens Polytope* that show equivalent conditions, including *Pléïades* as an acoustic piece. Although the *Mexico Polytope* and the *Athens Polytope* were scheduled to be performed in 1981 and 1985 respectively, both projects were unfortunately never completed nor premiered.

As seen in Xenakis' personal archives (including letters, sketches and other documents at the *Collection Famille Iannis Xenakis*), it was still during the period of composition of *Pléïades* that the composer started to create the *Mexico Polytope* that could culminate in the first application of his acoustic instrument outside the context of *Le Concile Musical*. In 1978, he was invited for this new project and began working on texts, sketches, ideas and concepts in 1979[6]. On August 3, 1981, Xenakis completed the first scenario of the polytope within seven pages of a project summary, possible sequence of actions and illustrations of the possible clothes and sets of visual results on the archeological site of Teotihuacán; nevertheless, far more materials are in the archives. The composer envisioned several different actions occurring in Teotihuacán, including the Avenue of the Dead, the Pyramid of the Moon, the Pyramid of the Sun, and the Temple of Quetzalcóatl, as described in his sketches and manuscripts.

Regarding the music itself, Sterken (2003, pp. 461-462) stated that "it is known with certainty that Xenakis did not intend to compose new music for this spectacle, for lack of elements of the original pre-Hispanic music that could have served as inspiration. On the other hand, he would have

[3] This is something that turned to be very important to the constitution of the ensemble Les Pléiades and to the construction of a new Sixxen in direct exchanges with Iannis Xenakis, see more details in Chapter 9.

[4] The *Mycenae Polytope* in particular represented many important symbolic aspects to the composer. It was firstly imagined when he visited the ruins of the Mycenae acropolis on his first return to visit Greece after his almost 30-year exile (1947 to 1974) forced by a death sentence issued by the military dictatorship. With the fall of the Greek junta in 1974 and the establishment of a Greek modern democracy, the death sentence against Xenakis was overturned and the travel to the country made possible, occasion in which he reencountered his father and brothers and had a warm reception as a war hero and a fierce combatant of the Greek democratic values and rights (more details in: Solomos, 1996; Harley, 2004; and Matossian, 2005).

[5] Much more about the *Polytopes* and those sound and light projects can be consulted in D'Allonnes (1975), Harley (1998), Sterken (2001; 2003), Harley (2004), Matossian (2005) and Turner (2014), among many others.

[6] The first indication of a precise date indicates May 11, 1979, but it is certain that some materials were previously elaborated.

thought of playing *Persephassa* [...] on large platforms, and of spatializing on the site some of his electroacoustic pieces."[7] However, some of these elements are the opposite of what Xenakis had indicated in his sketches and scenario (Fig. 4.1a).

**a)** **b)**

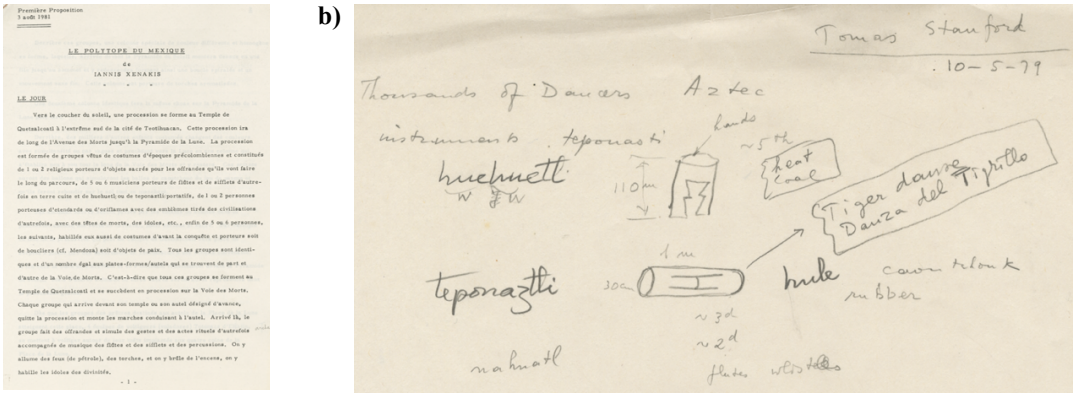



***Figure 4.1***. Documents and sketches tied to the initial development of *Mexico Polytope*. **a)** First scenario finished by Xenakis (August 3, 1981). Source: © Famille I Xenakis DR (Scenario of *Mexico Polytope*, p. 1). **b)** Notes and drafts (May 10, 1979) of traditional Mexican instruments huehuetl and teponaztli mentioned in the first scenario. Source: © Famille I Xenakis DR (Notes about *Mexico Polytope*).

Firstly, the composer intended that a new score would be specifically composed for this polytope, and secondly, *Persephassa* was not the only acoustic piece included in the occasion. As the composer stated, "an electroacoustic music that I will compose will be played on the Moon Square, interspersed with readings of historical texts or pre-Columbian rituals in the languages still spoken Mixtec, Nahuatl, Maya, etc. At one point, *Persephassa* is performed, followed by *Pléïades* on pre-Columbian percussion. The musicians are in a circle around the central altar of the Moon Square."[8] (Iannis Xenakis, scenario of *Mexico Polytope* in *Collection Famille Iannis Xenakis*, August 3, 1981). Although numerous elements of this statement capture are significant, the main factor is that Xenakis is imagining a version of the acoustic pieces "on pre-Columbian percussion". Some drafts indicate traditional instruments from Mexico (Fig. 4.1b), specifically the huehuetl (a drum used in different religious and warrior festivities) and the teponaztli (a slit drum with two pitches), both of which recur Pre-Columbian iconography. If Xenakis intended these instruments to be used in his percussion sextets, he may have replaced the wooden instruments and drums in *Persephassa* and only the drums in «*Peaux*». The composer gives no further details but this adaptation may highlight Xenakis'

[7] "Quant à la musique, on sait avec certitude que Xenakis n'avait pas l'intention de composer une musique nouvelle pour ce spectacle, par manque d'éléments de la musique originale préhispanique qui auraient pu lui servir d'inspiration. En revanche, il aurait songé à faire jouer *Persephassa* (une pièce pour percussion) sur de grandes plates-formes, et de spatialiser sur le site quelques-unes de ses pièces électroacoustiques." (Sterken, 2003, pp. 461-462).

[8] "Pendant ce temps une musique électroacoustique que je composerai sera jouée sur la Place de la Lune entrecoupée de lectures de textes historiques ou rituels précolombiens dans les langues encore parlées Mixtec, Nahuatl, Maya, etc. A un moment donné, exécution de Persephassa puis de Pléiades sur des percussions précolombiennes. Les musiciens sont en cercle autour de l'autel central de la Place de la Lune." (Iannis Xenakis, scenario of *Mexico Polytope* in *Collection Famille Iannis Xenakis*, August 3, 1981).

openness to different timbres, along with a reference to traditional instruments, their sonorities and their presence in a musical event as symbolic bearers of a representational force (something that could suggest some ways to construct a Sixxen, see more details in Chapter 8).

Ultimately, this polytope was not performed due to financial conditions. Because of the high cost necessary to accomplish the complete event, the *Mexico Polytope*, that was conceptually finished but never implemented, serves as the first unfinished polytope that would use a Sixxen in a new context, differing from the ballet and instrumental premieres. After this first essay that included *Pléïades*, Xenakis devised a possibility to present this piece during the *Athens Polytope* in 1985. The full plan of this specific polytope, including the main concepts and description of the sequence of events, was accomplished, and at this point was awaiting financial support and the final schedule for its implementation. This polytope would represent the opening spectacle of Athens' six months as cultural capital of the European Community, specifically in the year that would represent the European Year of Music[9]. However, in this instance, it was not financial problems that inhibited the completion of the project but rather technical issues and a concern for potential damage to the archaeological sites. The prime minister himself announced the cancellation of the event in February of 1985. As further explained by the local press:

> Last month, Xenakis went to Athens to seek the Greek armed forces' cooperation in providing helicopters and warships to take part in the show. He said the multi-media sound and light show, culminating with the release of hundreds of carrier pigeons, would be "a festival of peace." But the plan ran into vociferous opposition from archaeologists who feared the city's ancient monuments could be damaged by the "Polytope." (International Herald Tribune, 1985).

Even with this opposition to the specific polytope, there were many opportunities in 1985 that would reconnect Xenakis to his acoustic instrument. He composed *Idmen A B* with Sixxen that premiered on July 24, the *Festival Centre Acanthes* of 1985 included *Pléïades* in its activities and Les Percussions da Strasbourg unveiled the Sixxen model developed by Robert Hébrard and Albert Abitbol during the Festival Musica in Strasbourg on September 29.

## 4.2 *Idmen A B* (1985) and a new score for the SIX-XEN

The creation of the SIX-XEN was in 1978, but Xenakis would include his instrument in *Idmen A B* seven years later. This piece generated innovative ways to apply the multi-performer musical object, depicting that the creator's path with his instrument continued to be a source of fresh ideas to come. The historical aspects tied to *Idmen A B* commission and premiere, along with a broad

[9] As indicated by Gregoire (1983), this specific year was chosen because of the tricentenary of the birth of Handel, Bach and Scarlatti and was essentially conceived to encourage all those involved in music performance and to stimulate the participation of young composers.

description of its structural and timbre characteristics, will be brought to the forefront. With a section dedicated to the SIX-XEN references found in sketches of *Idmen A B*, the present chapter will indicate the main aspects of the creative process that inspired the composer to implement the instrument into practice (more details about the specific notation are outlined in Chapter 3–Subchapter 3.2.).

### 4.2.1 The commission and the premiere

*Idmen A B*, as with the previous Xenakian percussion sextets, was specifically written for Les Percussions de Strasbourg. This 30-minute work is divided into two parts, being respectively for choir with percussion quartet (*Idmen A*) and a percussion sextet with optional vocal parts (*Idmen B*). The concept of "part" and "movement" needs clarification because this composition could be considered as two independent pieces (*Idmen A* and *Idmen B*) that are integrated in a broader work (*Idmen A B*). In the integral work, the parts are not juxtaposed side by side as if they were movements, but rather they are imbricated by dividing into three sections each that will then be alternately played in a single sequence. The concept of movement is then not applicable because the two parts are not played in sequence, and the internal sections are presented differently than when played dissociated. Xenakis called it a "bicephalous work" and he gave many possible choices in a sort of pre-determined piece with open elements[10]. If both parts are presented separately, the percussion parts in *Idmen A* can be disregarded and the vocal parts in *Idmen B* do not have to be presented. Regarding this, the composer stated in a 1989 interview: "I prefer the two alternating in a single performance. I left open the possibility of the two being played separately because I thought it was difficult for a percussion group to enlist the services of a choir, and vice versa." (Varga, 1996, p. 179). As he precisely synthesized about the piece:

> Commissioned by the French Ministry of Culture for the European Music Festival in Strasbourg in 1985, *Idmen* is a bicephalous work whose parts can be performed together or separately. *Idmen A* is composed for big mixed choir with 32 real parts which can from then on include multiples of thirty-two singers. Four percussion keyboards are added. *Idmen B* is a part for the six musicians of the Percussions de Strasbourg, the brief intervention of the choir can be completely denied when the work is played separately. To the usual families of percussion instruments are added the sixxens, already used for the first time in *Pléïades*.[11] (Xenakis, 1985, p. i).

[10] Maurice Fleuret classified it as a "double work". As originally stated: "Idmen è un'opera doppia, le cui due valve possono essere eseguite insieme o separatamente." (Fleuret, 1988, p. 266).

[11] "Commande du Ministère de la Culture pour la Fête Européenne de la Musique à Strasbourg em 1985, *Idmen* est une œuvre bicéphale dont les parties peuvent être interprétées ensemble ou séparément. *Idmen A* est composée pour grand cœur mixte à 32 parties réelles qui peuvent à partir de cela inclure des multiples de trente-deux chanteurs. Il est rajouté quatre claviers de percussions. *Idmen B* est une page pour les six musiciens des Percussions de Strasbourg, la brève intervention du cœur peut être complètement niée quand l'œuvre est joué séparément. Aux familles d'instruments de percussions habituels sont rajoutés les sixxens, déjà utilisés pour la première fois dans *Pléïades*." (Xenakis, 1985, p. i).

The integral piece was premiered July 24, 1985 (Fig. 4.2) at the Rhenus Hall Strasbourg (France) during the 9th Europa Cantat[12]. With a choir comprising 4,000 singers and Les Percussions de Strasbourg, the event was part of the festivities for the 1985 European Music Year. The group was conducted by Edmon Colomer, with the composer in attendance. (Fig. 4.3).

**a)** **b)**

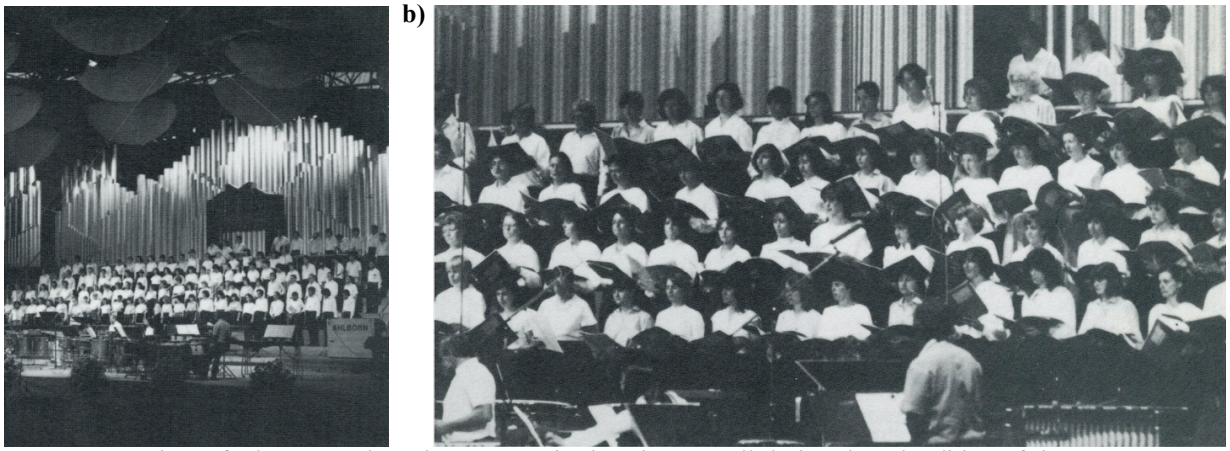


***Figure 4.2***. Premiere of *Idmen A B* the July 24, 1985 in the Rhenus Hall during the 9th edition of the Europa Cantat (Strasbourg, France). **a)** General view of the main stage with the percussion group and part of the choir. **b)** View of part of the choir and two percussionists in the front (Georges van Gucht on the left and Claude Ricou on the right). Source of both: © Famille I Xenakis DR (OM 30-12).

**a)** **b)** **c)**

***Figure 4.3***. Premiere of *Idmen A B* the July 24, 1985 during the 9th Europa Cantat (Strasbourg, France). **a)** Edmon Colomer conducting with percussionist Georges van Gucht and part of the choir in the background left. **b)** Part of the public with Maurice Fleuret, Marcel Corneloup and Iannis Xenakis in the foreground. **c)** Xenakis and Colomer in the foreground and percussionist Georges van Gucht and part of the choir in the background. Source: © Famille I Xenakis DR (OM 30-12).

The repertoire of the concert also included Bach's *Singet dem Herrn ein neues Lied* BWV 225 and Händel's *Moses song*, an excerpt from *Israel in Egypt* (1738). The percussionists performing at

[12] Europa Cantat is a choir festival still in activity that generally gathers a larger number of singers (up to 4,000) to develop and perform an ancient and new repertoire. It is organized since 1961, having an edition each three years with ateliers, workshops and many concerts. Diverse composers were specially invited to dedicate a new piece to the project such as Henri Pousseur, Jan Van der Roost, among many others.

the premiere were Georges van Gucht, Gabriel Bouchet, Jean-Pierre Bedoyan, Christian Hamouy, Keiko Nakamura, and Claude Ricou, all of who would record *Pléïades* in 1987, as visible in Fig. 4.4.

***Figure 4.4***. Percussionists of the premiere of *Idmen A B* the 24 July, 1985. From left to right: Christian Hamouy, Jean-Pierre Bedoyan, Gabriel Bouchet, Claude Ricou, Keiko Nakamura and Georges van Gucht. Source: © Famille I Xenakis DR (OM 30-12).

The entire project was the consequence of a meeting between Xenakis and a Europa Cantat representative in September 1983. Some details about the initial commission process can be observed in a letter written in December 12, 1983 by Jean Sturm[13]. There is reference to a concert of Xenakis at the Festival Musica in 1983 mentioning the presence of Paul Wehrle[14] that encountered the composer after the performance. Through this meeting came an invitation for Xenakis to compose a new work for July 1985. The agreement in principle being made at the festival in 1983, Xenakis received the letter on December 1983 confirming the intention of Europa Cantat to request a state commission from the Ministry of Culture for his new work. The date for the premiere (July 24, 1985) was thus established, the ensemble director is mentioned as Edmon Colomer and the participation of Les Percussions de Strasbourg is also confirmed at this time ("Les Percussions de Strasbourg are enthusiastic about creating this work"[15]). The possibility of composing for more instruments is mentioned in the letter but also highlighted that the festival could not count with a full orchestra. After the letter, a phone call on December 29, 1983 gives Xenakis many more details to start drawing his ideas. The specifics are more related to the choir and its size, as it was put in evidence by one of the composer's note:

> 4000 amateur choristers mixed with the public
> for 5 workshops 100 to 400 per workshop

[13] Jean Sturm was the vice-president for this edition of the Europa Cantat.
[14] Paul Wehrle was the founding Secretary General of Europa Cantat from 1963 to 1976. He was also one of the founders of the International Federation for Choral Music (IFCM) in 1982, becoming its first president. At the time of the meeting with Xenakis, he was then president of the musical commission of the 9th Europa Cantat Festival.
[15] "Les Percussions de Strasbourg sont enthousiastes pour créer cette oeuvre." (Jean Sturm, mail to Iannis Xenakis, December 12, 1983).

> 80% can read the scores ≅ 3000 choristers
> 4 classical voices
> 1 workshop for my piece (100 to 400)
> 5 hours x 5 days of rehearsal + pre-general + general
> In total 30' of rehearsals for the 4000
> between 20' and 40' [of composition]
> Electro. Acoustician Oton Schneider[16] (Iannis Xenakis, note in *Collection Famille Iannis Xenakis*, December 29, 1983).

In a June 1984 exchange (Jean Sturm, mail to Iannis Xenakis, June 30, 1984), Xenakis received the confirmation from Europa Cantat that the documents requesting the commission was sent to the French Culture Ministry and it likely to be accepted. However, the event organizers also emphasized that rejecting the request would jeopardize their financial situation and they would receive the final decision from the Ministry only in January 1985. In the same letter, they establish that the composer should deliver the score by February 1985. Fortunately, the commission request was successful and Maurice Fleuret, then Director of Music at the Ministry of Culture, confirmed the acceptance of *Idmen A B* as a state commission on April 1985 (Maurice Fleuret, mail to Iannis Xenakis, April 13, 1985).

Xenakis began composing the piece around the beginning of October 1984 and essential points about spatialization and the choir size were yet to be decided. An October 3rd phone call to Jean Sturm, of which is confirmed by an October 4th letter, discusses these details. As written by Sturm to Xenakis:

> I think it would be useful to summarize our conversation of yesterday concerning the work commissioned by Europa Cantat
> Staff: 150 choristers. A baritone soloist taken from the choir. Possible interventions of the crowd if it only requires a short tuning at the beginning of the concert – Six percussionists (the nomenclature of their available instruments was communicated to you) – Possibility of laser animation.
> As far as the spatialization effects are concerned, it is absolutely impossible to foresee pods suspended from the canopy. A ground spatialization can be studied but it implies the construction of trays, thus costs and the suppression of a certain number of places: precise indications should be given very quickly, a meeting with the architect would be desirable.
> Acoustic device: the balloons are planned above the stage, a multitude of tubes of different diameters above the stands.[17] (Jean Sturm, mail to Iannis Xenakis, October 4, 1984).

[16] "4000 choristes mélangé au public / pour 5 ateliers 100 a 400 par atelier / 80% lisent les partitions ≅ 3000 choristes / 4 voix classiques / 1 atelier pour ma pièce (100 à 400) / 5h x 5 jours de répétition + prégénérale + générale / Au total 30' de répétitions pour les 4000 / entre 20' et 40' [de duration pièce] / Eletro. Acousticien Oton Schneider" (Iannis Xenakis, note in *Collection Famille Iannis Xenakis*, December 29, 1983).

[17] "Je crois utile de résumer notre entretien d'hier concernant l'œuvre commandée par Europa Cantat / Effectifs 150 choristes. Un soliste baryton pris dans les chœurs. Interventions possibles de la foule si cela ne nécessite qu'une courte mise au point au début du concert – Six percussionnistes (la nomenclature de leur parc instrumental vous a été communiquée) – Possibilité d'animation laser. / En ce qui concerne les effets de spatialisation, impossibilité absolue de prévoir des nacelles suspendues à la verrière. Une spatialisation au sol peut être étudiée mais elle implique la construction de plateaux, donc des frais et la suppression d'un certain nombre de places : des indications précises devraient être données très rapidement, une rencontre avec l'architecte serait souhaitable. / Dispositif acoustique les ballons sont prévus au-dessus de la scène, une multitude de tubes de différents diamètres au-dessus des gradins." (Jean Sturm, mail to Iannis Xenakis, October 4, 1984).

The text shows that during this period, Xenakis' intent was once more fixed on creating an installation with laser effects, similar to what he had developed in the *Polytopes*, and he also highlighted a desire to disperse the percussionists in a hexagon arrangement (as previously occurred in *Persephassa* in 1969) surrounded by the choir. As mentioned in the letter above, the Rhenus Hall would receive specific acoustic treatment for this occasion (as confirmed in photos of the premiere, background and/or top of Figs. 4.2, 4.3a and c)[18]. In the same exchange, the composer affirmed that the score would be finished by March 1, 1985, and a sketch should be sent to Europa Cantat by January 1st for an evaluation of the level of the difficulty for the choir. The exchange also confirms the schedule to rehearse the piece, including the rehearsal with the laser projections.[19]

Through this, it is evident that Xenakis strove to put in place an electroacoustic installation associated with the piece. It is even likely that he desired laser systems and light devices as he usually included in his *Polytopes*. He established contact with different experts and a company called "Laser Design" from Strasbourg sent brochures about its devices and systems (Fig. 4.5a and b).

**a)** **b)** **c)**

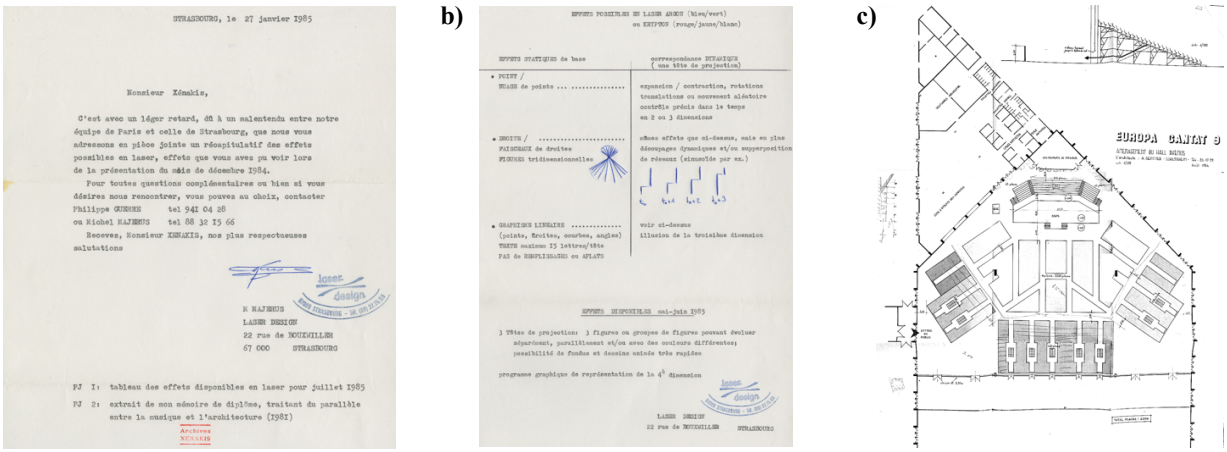



***Figure 4.5***. Documents exchanged with Iannis Xenakis about a possible laser installation during the premiere of *Idmen A B* (1985). **a)** and **b)** Letter exchanged with the company "Laser Design" showing the material available and specifics of the devices. **c)** Architectural plan of the Rhenus Hall. Source: © Famille I Xenakis DR (OM 30-12-2).

[18] The Rhenus Hall was built in Strasbourg as a sport gymnasium but with some conditions to receive concerts that demands a big stage or the reception of a large crowd. The venue was the scene of countless concerts until the beginning of the 2000s, when a bigger concert hall with conditions for even larger events was constructed nearby.

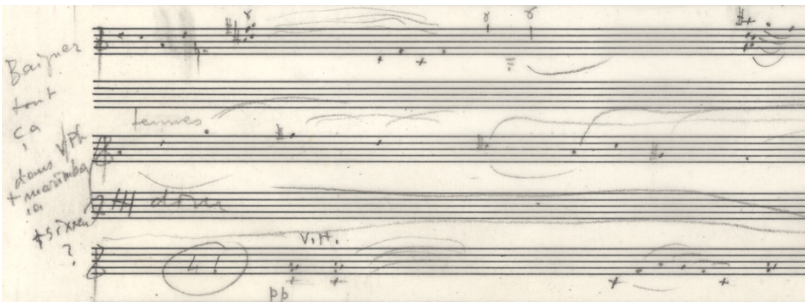
[19] About the rehearsals and schedule in Strasbourg, it is mentioned in the letter: "The workshop will begin on July 15. During the first three days, it will have all the time necessary to work since no other activities are scheduled. From the 18th to the 21st, there will be three hours of workshop in the morning and two hours in the afternoon. We expect 4 rehearsals with the instruments on July 22 afternoon, 23 morning and evening with laser; general on the 24th with a sequence of the full program which also includes a Bach motet and Handel's Canticle of Moses." As originally written: "L'atelier débutera le 15 juillet. Durant les trois premiers jours, il disposera de tout le temps désirable pour travailler puisqu'aucune autre activité n'est prévue. Du 18 au 21, il y aura trois heures d'atelier le matin et deux heures l'après-midi. Nous prévoyons 4 répétitions avec les instruments le 22 juillet après-midi, le 23 matin et soir avec laser ; générale le 24 avec enchaînement du programme complet qui comporte également un motet de Bach et le cantique de Moïse de Haendal." (Jean Sturm, mail to Iannis Xenakis, October 4, 1984).

Xenakis also received the architectural plan of the Rhenus Hall (Fig. 4.5c), and studied how to accomplish the monumental task involving 4000 singers, six percussionists, and potentially a complete electronic installation. However, it was not until early 1985 that the composer would connect with a laser company to accomplish this task. This is shown via a letter from January 27,1985, as the company sent the list of their equipment available for July of the same year[20]. However, this plan was not realized due to an unexplained reason (could be financial, time organization, technical, or another explanation), and Xenakis abandoned this idea before the premiere that was then completely acoustic.

### 4.2.2 The SIX-XEN in the manuscripts

From the beginning of the composition of *Idmen*, Xenakis considered the SIX-XEN as an acoustic resource for the new project. Whether the instrument would be used or not was originally in question, but as the creative process continued, the instrument progressively passed from a doubt to a certitude, even if this was ultimately established as a choice for the performer. Some documents expose these doubts and, even if they have no precise dates to be situated in the creative process, they show initial structural elements of the composition. In these drafts, the Sixxen or sixxen[21] is mentioned, but it appears simply as a possible timbre to be used and specific materials are not exclusively developed for the instrument (Fig. 4.6).

**a)**



**b)**

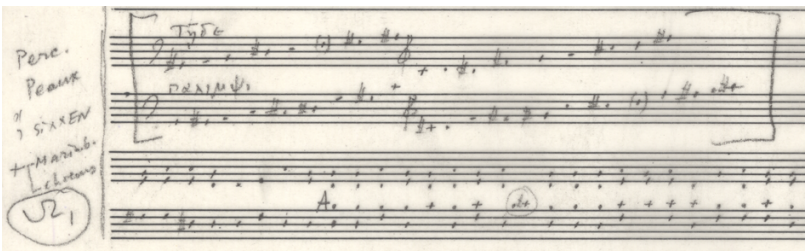


***Figure 4.6***. Initial drafts and sketches of *Idmen A B* (1985) mentioning a potential use of a Sixxen. **a)** and **b)** Indications of "sixxen" are made with the production of initial melodic and harmonic structures. Source: © Famille I Xenakis DR (OM 30-12-1 pp. 6-7).

[20] The responsible at the company includes part of his own graduation assignment with the letter. The work called "*Rôle de la musique parmi les instruments conceptuels du projetage architectural*" was presented by Michel Majerus in 1981 and includes a mention about Xenakis and the Philips Pavilion.

[21] It is not clear in these sketches if the composer had the initial intention to use all six unities (a Sixxen) or only few of them. However, the final result would make possible some choices considering only one or two sixxens.

In Xenakis' personal notes, it is perceptible that the first sketch about the piece with a date was produced on December 8, 1984 (Fig. 4.7) and indicated the term "Sixxen". In this document, he was essentially describing his previous works with voice as *Nekuia* (1981), *Cendrées* (1973), *Nuits* (1967), *Medea* (1967), *À Colone* (1977), and *À Hélène* (1977). He also described his piece for twelve cellos *Retours-Windungen* (1976) as a possible beginning to *Idmen*. He was using these references as an indication of possible treatments, textures and passages as a sequence of ideas, with some dynamics and effects also mentioned. There are references about previous pieces found in the percussion parts as well (mainly *Persephassa*[22], *Komboï* and *Pléïades*) and the composer directly mentioned the SIX-XEN in the sketches (Fig. 4.7b); thus, from the beginning it is clear that *Idmen* would be the piece with new materials for his instrument.

**a)** **b)**

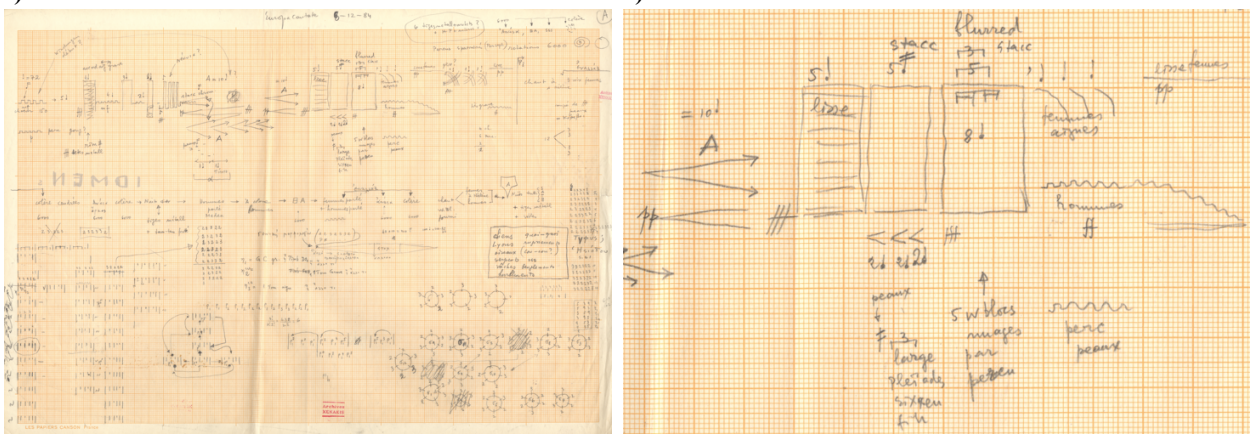


***Figure 4.7.*** Notes in the first sketch of *Idmen A B* (1985) dated from December 8, 1984. **a)** View of the complete sketch. **b)** Detail showing a mention about *Pléïades* and the possible use of a Sixxen. Source: © Famille I Xenakis DR (OM 30-12-1 p. 9).

After this sketch, another one from February 6, 1985, presents some notes that are specifically tied to the group of instruments (Fig. 4.8), as well as the organization of the introduction of the piece and explanations about its requirements. These notes are consistent with the deadline that was established in a previous letter (Jean Sturm, mail to Iannis Xenakis, June 30, 1984) to present an initial score to the organizers of the Europa Cantat and evaluation of the level of work to organize the rehearsals and the concert. In this 1984 letter, they establish that the composer would deliver the score in February 1985, so this specific sketch shows that Xenakis has either finished the score or at least advanced in the writing process. The sketch from February 6, 1985, shows that some rhythmical materials are still developing, but the different sections and all the instruments required are

[22] In this sketch, he is thinking in a surround disposition of the percussionists as in *Persephassa* (as he mentioned "*Percus spatialisés (Perseph.) rotations 6000*").

determined. The use of a sixxen is clearly indicated here and shows the possible ways as it will be required in the final score.

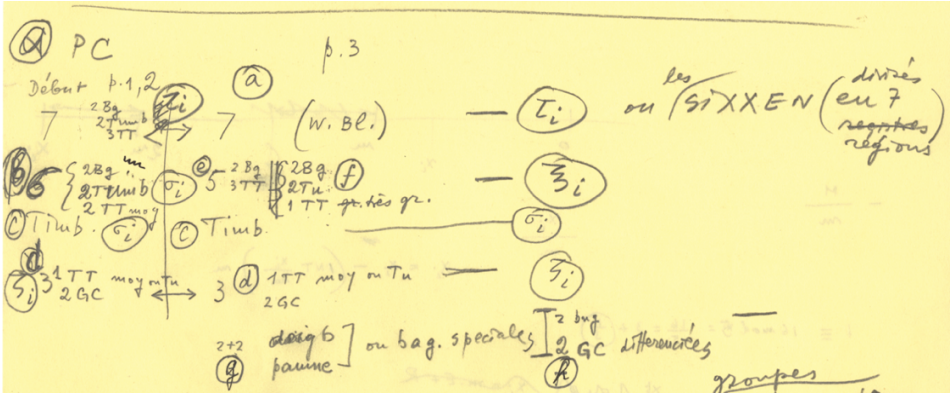



***Figure 4.8***. Sketch from February 6, 1985 presenting the group of instruments and the seven bars of a sixxen as one of the possible choices that the musicians have to decide. Source: © Famille I Xenakis DR (OM 30-12-1 p. 2).

As mentioned in the section 4.2.1, until February 2, 1985, the composer was trying to incorporate the electronic devices and continued to configure the disposition of the musicians. This could highlight that the composition was developed with the idea that the acoustic material (and by consequence the SIX-XEN) would be presented with an installation of light and laser. However, the manuscripts and personal documents do not elaborate on specific material for this visual part of the spectacle, which may show that the absence of this part was the lack of time that the composer faced. After addressing these elements in the manuscripts, it is important to expose the final piece and its characteristics, as well as the way the sixxens were ultimately implied

### 4.2.3 Timbre characteristics and formal structures

*Idmen A* essentially constitutes three parts called «*CA*» (with approx. 2’ 10” length), «*CB*» (approx. 3’ 30”) and «*CC*» (approx. 9’). If *Idmen A* is played separately, those three parts must be presented in a noninterrupted sequence (with 15’ approx.) and if presented with *Idmen B* they must be interspersed with the parts of this second part. The text in *Idmen A* is based on *Theogony* by Hesiod and *idmen* is the first word of the 27th verse, representing part of a speech by the Muses for the author[23]. The excerpt generally translates as the muses expressing: “We know how to tell lies similar to the truths.” Xenakis then paraphrased it as “we also know how to tell truths similar to lies”.

[23] The mention below is from vv. 25-29 of the *Theogony*:

| | |
|---|---|
| *Mousai Olumpiades, kourai Dios aigiochoio:* | Muses of Olympus, daughters of Zeus the aegis-bearer, [said]: |
| *poimenes agrauloi, kak’ elegchea, gasteres oion,* | “Shepherds living out of doors, objects of disgrace, mere bellies, |
| *idmen pseudea polla legein etumoisin homoia,* | we know how to tell many lies that are like reality, |
| *idmen d’ eut’ ethelômen alêthea gêrusasthai.* | we also know, when we want, how to proclaim the truth.” |
| *hôs ephasan kourai megalou Dios artiepeiai.* | so spoke the daughters of great Zeus, [those] ready of speech. |

The part «*CA*» requires the 32 voices choir with a non-vibrato timbre and two marimbas. «*CB*» also has marimbas with choir but the section concludes with a *fff* attack on drums that are tuned in a wide musical range for all percussionists. «*CC*» requires glockenspiel, xylophone, vibraphone and marimba that characterize the main accompaniment, but in the last nine measures the composer writes *fff* attacks once more on drums for all percussionists.

*Idmen B* (with approx. 14'), as *Idmen A*, is also divided in three parts, but they are then called «*PA*» (with approx. 5' 30"), «*PB*» (5' approx.) and «*PC*» (3' approx.). In «*PA*», in meas. 65 to 77 there are choir parts indicated that must be disregarded when the movement is performed separately. In this movement, the percussionists are classified from A to F and arranged in this order on the stage[24], resulting in a linear disposition that allows a series of stereophonic effects used by the composer throughout the piece.

The percussion instruments required in *Idmen B* vary throughout the three sections. In «*PA*», the sextet is divided in three groups of instruments: having A and F bongos, 2 congas and 5 woodblocks; B and E bongos, 3 toms, 2 timpani and 5 woodblocks; and C and D bongos, 3 toms, 2 bass drums, 5 woodblocks. This organization of instruments mirrors the structure of the timbre disposition with D, E and F being the mirror image of the arrangement of instruments in A, B and C respectively. «*PA*» begins with drums but from meas. 57 on, musicians C and D introduce the woodblocks, and from meas. 61 onward the woodblocks are the main timbre until the end of the part (meas. 78).

In «*PB*», Xenakis implies five groups of timbre (called α, β, γ, δ and ε) that all musicians must use. Group α is characterized by three congas and two bass drums; β by bongos, three toms, two bass drums and timpani; γ is an indication of using the hand technique; δ by bongos and two bass drums; and ε is a part with three congas and three timpani. It is then in «*PB*» that a sixxen may be used from meas. 69 until 72 (Fig. 4.9). Those are the final four measures of the section and, although short, it is an important passage in higher dynamics that accentuate the passage to the part «*CC*» of *Idmen A* (if the complete version of *Idmen A B* is performed) or «*PC*» (if only *Idmen B* is presented).

[24] As indicated by the composer in the score: A B C D E F
public

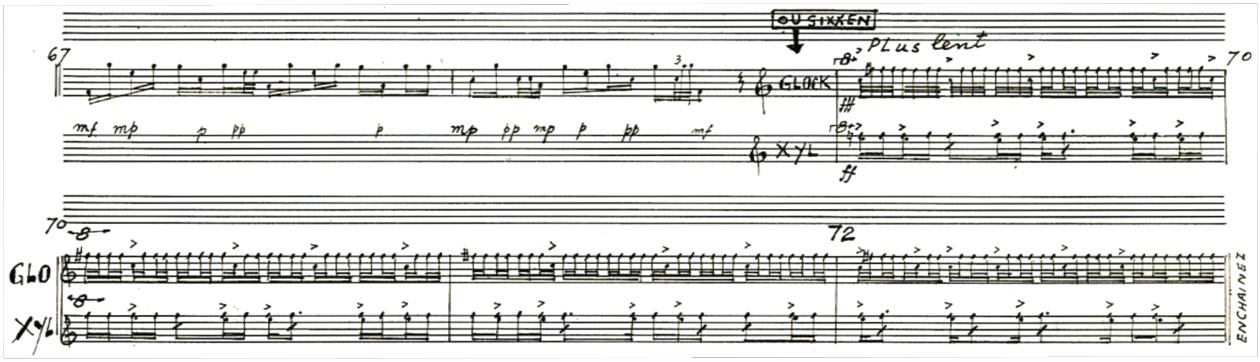



***Figure 4.9***. Excerpt of *Idmen B* showing the potential use of sixxen as a substitute to the glockenspiel in a change of texture and dynamic to the underline the end of the section «*PB*». Source: *Idmen A B*, meas. 67-72 (Xenakis, 1985) – © Éd. Salabert.

It is unclear in Xenakis' indication if the sixxen could substitute only the glockenspiel or the xylophone, nor if Xenakis intended to have the six unities playing these parts. The indication seems to refer only to glockenspiel, because the word SIXXEN is singular and thus the opposition metal and wood instrument would be still respected. The manuscripts do not elucidate this intention, yet Xenakis gave freedom to the performer and this part could potentially played with one, two or possibly more sixxens. In the recording of the ensemble Les Pléiades[25], this passage was presented using both glockenspiel and xylophone, but also adding notes of 4 sixxens that played only the accents. Fleuret (1988) named each of the sections by numbers, calling then *Idmen A* 1, *Idmen A* 2, *Idmen A* 3, and *Idmen B* 1, *Idmen B* 2, *Idmen B* 3. He shortly addressed each section and described the plural use of sixxen of this specific part:

> *Idmen B* 2. And from one end to the other is a monody in very rapid values, passing restlessly from one instrumentalist to the next, with an effect more spatial than timbral, as all play membranes. But there is also here an event-surprise at the end (meas. 69): the sudden entry of the glockenspiel and xylophone (or SIX-XENs), which allows the connection with what follows.[26] (Fleuret, 1988, p. 267).

For the last part of *Idmen B* called «*PC*», Xenakis indicates ten potential groups of instruments (classified as a, b, c, d, e, f, g, h, j, k)[27], and the group j requires a sixxen divided into seven bars ("*Sixxens reparties en sept régions*"). All the instruments are not required for the six percussionists because the section «*PC*» is presented with four (meas. 1-24) or five staves (meas. 25 until the end), and each instrument could be played by one or by many percussionists (as he expressed, "The six

[25] The disc called "Iannis Xenakis. Idmen Pléïades. Les Pléiades Choeur Gulbenkian Sylvio Gualda" was released in 1992 by the label Erato Disques (2292-45771-2). See more about it in Chapter 11–Subchapter 11.3.

[26] "*Idmen B* 2. E da un capo all'altro una monodia in valori molto rapidi, che passa senza sosta da uno strumentista all'altro, con un effetto più spaziale che timbrico, poiché tutti suonano le membrane. Ma c'è anche qui un evento-sorpresa alla fine (batt. 69): l'improvvisa entrata del Glockenspiel e dello xilofono (o dei SIX-XEN), che permette il concatenamento con quanto segue [underline added]." (Fleuret, 1988, p. 267).

[27] Group a is characterized by bongos, two congas and three toms; group b by bongos, two congas, two toms; group c by timpani; group d by one tom or conga and two bass drums; group e by bongos and three toms; group f by bongos, two congas and a tom; group g it is again an indication of timbre change (with the use of hand techniques or "special mallets"); group h demands bongos and two bass drums; group j requires a sixxen divided into seven regions ("Sixxens reparties en sept régions"); and group k requires seven woodblocks.

percussionists distribute themselves, even doubling or tripling, the staves that follow, to the best of their sonorities and positions on stage"[28]). Again, the composer gives freedom to the percussionists in terms of timbre choice and set-up. Part «*PC*» is segmented in two subsections, with the first (meas. 1 to 24) completely organized with instrument groups a, b, c and d (Fig. 4.10). In this first subsection, two musicians must decide in which staff they will play doubling or tripling it.

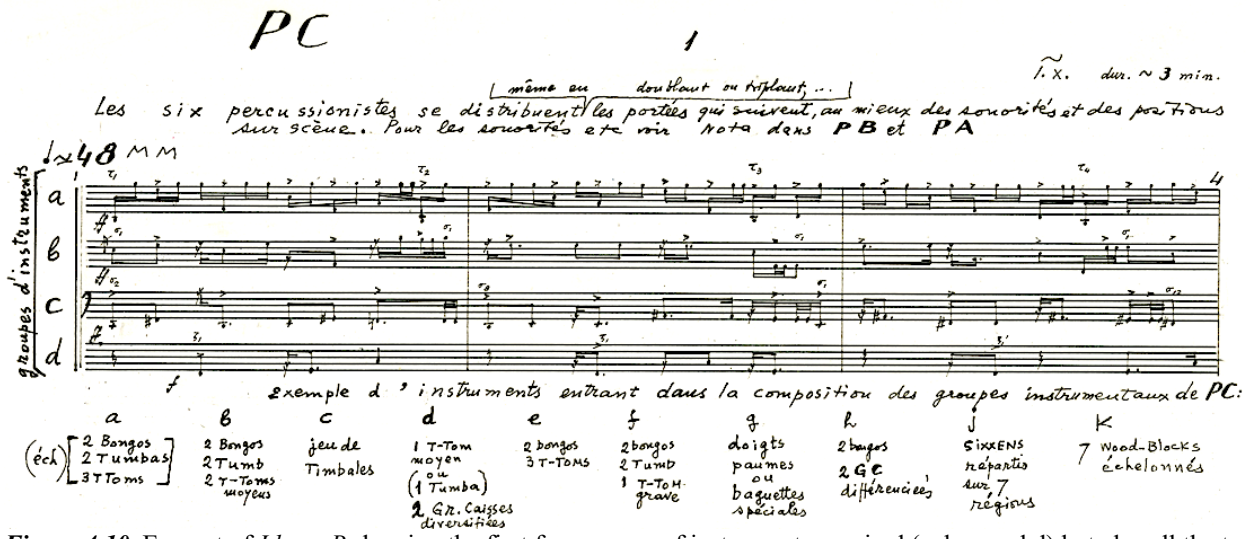



***Figure 4.10***. Excerpt of *Idmen B* showing the first four groups of instruments required (a, b, c and d) but also all the ten timbre groups of the section «*PC*» (a to k). Source: *Idmen A B*, meas. 1-3 (Xenakis, 1985) – © Éd. Salabert.

In the second subsection of «*PC*» (meas. 25 until the end), a fifth staff is added, and this part represents that more choices must be made (Fig. 4.11). Instrument groups c and d indicated in the fourth and second staves have necessarily to be executed but there is a clear option of instrument groups concerning the first, third and fifth staves (from below to above–Fig. 4.11). For example, the musician who will play the first staff would choose instrument group g or group h; in the third staff, the musicians have the options of group e or group f; and the fifth staff gives an option between groups a, j or k.

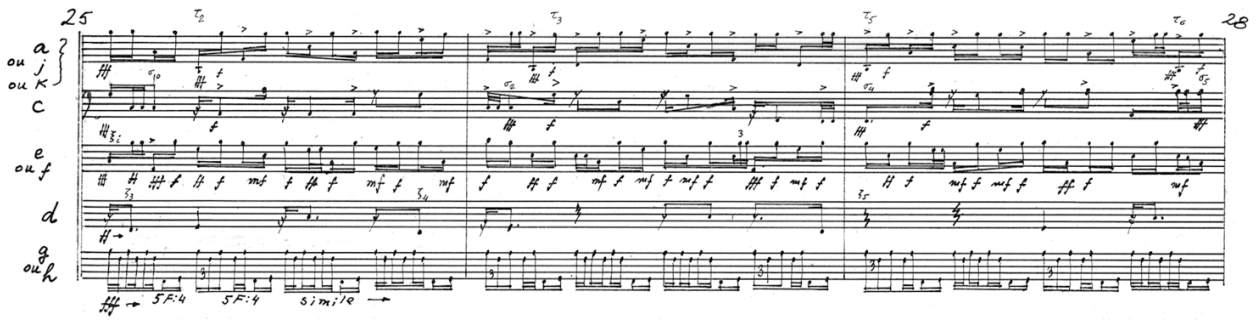



***Figure 4.11***. Excerpt of *Idmen B*, part «*PC*» (meas. 25 to 27), showing the presence of a fifth staff and the potential selection of instrument groups, including in group j a sixxen. Source: *Idmen A B*, meas. 25-27 (Xenakis, 1985) – © Éd. Salabert.

[28] "Les six percussionnistes se distribuent, même en doublant ou triplant, les portées qui suivent, au mieux des sonorités et des positions sur scène." (Xenakis, 1985, «*PC*», p. 1).

Because instrument group j is characterized by a sixxen and because the first staff would have two percussionists playing, the composer gave an opportunity to have two sixxens playing together in this specific part[29]. This is the final section of this entire piece, independently if presented as the complete choir with percussion version (*Idmen A B*) or only the percussion group version (*Idmen B*). If the sixxen is the choice of the group, it would then appear in only two excerpts, as indicated in Table 4-2. Therefore, the optional use of this instrument was only included in *Idmen B* and at the end of two parts («*PB*» and «*PC*»), being also the end of the piece.

***Table 4-2***. Sections in *Idmen A B* with metronomic indication and the potential presence of sixxen(s) in each part. The number of the first and the last measure of each section is indicated to proportionally situate the excerpt with sixxxen(s).

| | ***Idmen A*** | ***Idmen B*** | ***Idmen A*** | ***Idmen B*** | ***Idmen A*** | ***Idmen B*** |
|---|---|---|---|---|---|---|
| **Section** | «*CA*» | «*PA*» | «*CB*» | «*PB*» | «*CC*» | «*PC*» |
| **Duration** | ≅ 2’ 10” | ≅ 5’30” | ≅ 3’ 30” | ≅ 5’ | ≅ 9’ | ≅ 3’ |
| **Metronomic indication** | ♩ ≅ 33mm | ♩≅ 48mm | ♩≅ 44mm | ♩≅ 60mm | ♩≅ 44mm | ♩≅ 48mm |
| **Meas.** | 1 18 | 1 78 | 1 39 | 1 69 72 | 1 96 | 1 25 36 |
| **Use of sixxen if chosen (quantity)** | | | | (1 or 2) | | (1 or 2) |

Xenakis has explicitly open more choices of instruments in the piece affirming that “The nomenclature of the percussion instruments in all the sequences are indicative. They could be replaced by others but respecting the mood of the music. For example: replace the neutral western skins by beautiful ones from Asia, Oceania, Africa...”[30] (Xenakis, 1985, «*PA*», p. 1). About *Idmen B* specifically, the composer stated:

> I was thinking of the different spacing of the instruments. The effect varies according to the number of instruments playing, and you also shift from one group to another with meaningful results. The sound is, as you say, varied, but percussion instruments are somehow too homogeneous. At the time of writing *Idmen A* and *B* I was studying African percussion-playing in some depth. I didn’t base the variations of the rhythmic patterns on African music, but I was intrigued to observe players in Senegal. I recorded them on my portable machine and studied their technique on my return home.
> *Idmen B* tackles the problem of pure rhythm. Writing for percussion is somewhat like writing for piano rather than for orchestra. The piano has a more homogeneous sound and is consequently much more difficult to write for interestingly: it has just one color. It was similarly a challenge to produce a worthwhile percussion work just for skins, for instance. The first such piece was *Persephassa*, I think, followed by *Psappha*, then by *Pléiades* and so on. *Idmen B* belongs with this group of compositions.” (Varga, 1996, p. 179).

In the Xenakis’ archives, specifically the recordings stored at the BnF, it is possible to observe that three different versions of *Idmen A B* were recorded and sent to Xenakis (Table 4-3).

[29] As an option this could also do not happen at all, as it is the case in the recording made by the ensemble Les Pléiades in 1992. They use a sixxen in the excerpt of «*PB*» but no sixxen in «*PC*», using only drums to this final section.
[30] “La nomenclature des instruments à percussion dans toutes les séquences sont à titre indicatif. Ils pourrait être remplacés par d’autres mais en respectant l’esprit de la musique. Par exemple: remplacer les peaux occidentaux neutres par de belles d’Asie, Océanie, Afrique...” (Xenakis, 1985, «*PA*», p. 1).

***Table 4-3***. Iannis Xenakis' recordings of *Idmen A B* archived at the *Bibliothèque nationale de France* (BnF).

| Identification | Name | Indication about the tape | Specifics |
|---|---|---|---|
| **DONAUD 0604 29 –Xenakis 32** | *Idmen A, Idmen B* Varsovie, 21 Septembre 1986 | Groupe de percussion de Varsovie, dir. S. Skoczynski – Schola Cantorum Gedanensis, dir. Eukaszewski | 7' – 19 cm/s ? |
| **DONAUD 0604 679 –Xenakis 726** | *Idmen (A et B)* Hall Rhenus, 27/07/1985 (concert) | Son: Bruit Son Musique Production: A Cœur Joie Alsace | cassette ? |
| **DONAUD 0604 680 –Xenakis 727** | *Mikka "S", Idmen A et Idmen B* 22 et 24 Septembre 1986, Academy of Music Warsaw Autumn Festival | *Mikka "S"*: Roman Lasouki (violon) *Idmen A* et *Idmen B*: Schola Cantorum Gedanensis, Warsaw Percussion Group, Dir. Jan Lukaszewski | cassette 3'45 30'20 |
| **DONAUD 0604 687 –Xenakis 734** | *Idmen* (*A* et *B*) 30/02/88 | | cassette ? |
| **DONAUD 0604 866 –Xenakis 917** | *Idmen* (*A* et *B*)*, Pléïades* 1989 | *Idmen* (*A* et *B*) par le Choeur de la fondation Gulbenkian *Pléïades*, dir. Sylvio Gualda ("Cassette promotion Salabert") | cassette ? |

The material features recordings such as the premiere by Les Percussions de Strasbourg and the first performances by the ensemble Les Pléiades, and is a source for new researches.

### 4.2.4 Considerations about the SIX-XEN and the ways it was applied

Three considerations on the employment of the SIX-XEN in this work must be addressed. It is perceptible that its practical application was completely different when compared to *Pléïades*. Firstly, Xenakis used a mixed formation with his instrument for this occasion. While in *Pléïades* the use is exclusively with percussion, in *Idmen* the composer associated the timbre of his instrument with the use of voice. Even if the instrument is an option rather than strictly required, the piece represents a method that will recur later in the development of its repertoire (see more details in Chapter 11), including the association of SIX-XEN with non-percussive timbres.

Secondly, he did not necessarily consider SIX-XEN only for a set of six interconnected parts; therefore, in *Idmen B* there are individual and separate parts required for the entire set. There is the possibility of using 1 or 2 sixxens at the end of part «*PB*» (meas. 69-72) and at the end of section «*PC*» (meas. 25-36). In both excerpts, the choices may alter the resulting timbre; however, if used, the instrument is not "complete" as it is necessarily in «*Métaux*», showing thus that Xenakis integrated the possible use of parts of SIX-XEN (even one unique sixxen). The composer himself was the first to not necessarily compose for the Sixxen as a whole, a concept of which reappears in the later repertoire.

Thirdly, the Sixxen is imagined by Xenakis as a keyboard, or at least an object similar to the materials of glockenspiel and xylophone. This is evident because the idea that a sixxen could replace some passages of those instruments is one of the suggestions that Xenakis made in the final score.

After the second piece for SIX-XEN, a completely new step in the use of Sixxen would emerge during the spectacle called *Taurhiphanie*: a simultaneous performance with two different prototypes with twelve musicians playing. This would not produce a new score, but *Pléïades* was reimagined in a new disposition during this specific spectacle. This disposition occurred in a situation in which bulls and horses would be the main agents of a zoo-choreographic proposition made in a Roman arena in France. An atypical situation that brought a once more typical Xenakian situation: surpassing previous boundaries.

## 4.3 *Taurhiphanie* (1987-1988): a new "doubly surrounding" approach with Sixxens

Xenakis was invited to compose a new piece for two festivals debuting simultaneously, the *Festival de la Radio France Montpellier* and the *Festival d'Arles* (France) in 1987. However, beyond this commissioned piece, he developed a new spectacle that shared similar particularities and characteristics with the polytopes. Created on July 13, 1987, in an ancient Roman arena constructed in Arles[31], he not only assembled musicians, lights and electronic sounds but also horses and bulls, having the natural and mythological aspects of those animals as the main concept[32] and being thus called *Taurhiphanie* (from the Greek terms *taurus*, *hippos* and the suffix of epiphany[33]). Harley (2014) denominated this effort of working with the move of animals as an "abstract ballet". As the author affirmed: "A final effort to explore this notion of 'abstract ballet' took place in 1987 with *Taurhiphanie* in the Roman arena in Arles, southern France. The presentation of this new UPIC work (also with music for percussion ensemble) was enhanced by the lighting and the cavalcades of bulls and horses around the arena."[34] (Harley, 2014, pp. 120-121).

To further discuss this work, it is necessary to specify two concepts of *Taurhiphanie*: the spectacle and the piece. The spectacle was an amalgam of sound–produced by different Xenakis' percussion pieces and a new electronic piece using pre-recorded sounds and sounds captured live

[31] The Arles arena represents a Roman amphitheater built around AD 80 and 90 by Tiberius Caesar Augustus, as part of the extensions of the city. It is currently in activity, being a place that hosts spectacles and festivals, theater and musical performances, but evidently bullfights and horse races typical from the French region called Camargue.
[32] As Fleuret (1988, p. 185) also stated: "As these Roman arenas were normally used for bullfights, Xenakis imagined, under the title of *Taurhiphanie*, a kind of wild game of sound and beast, of which the Camargue bulls were to be the main actors." As originally expressed: "Essendo queste arene romane utilizzate normalmente per le corride, Xenakis immaginava, sotto il titolo di *Taurhiphanie*, una specie di gioco selvaggio del suono e della bestia, di cui i tori della Camargue avrebbero dovuto essere gli attori principali." (Fleuret, 1988, p. 185).
[33] As the composer himself explained: "The title comes from 'tauros' (bull), 'hippos' (horse) and 'epiphany' (apparition)." (Xenakis, 1996, p. 192).
[34] "Un dernier effort pour explorer cette notion de « ballet abstrait » a eu lieu en 1987 avec *Taurhiphanie* dans les arènes romaines d'Arles, dans le sud de la France. La présentation de ce nouveau travail upicien (avec aussi la musique pour ensemble de percussions) était renforcée par l'éclairage et les cavalcades de taureaux et de chevaux tout autour de l'arène." (Harley, 2014, pp. 120-121).

(both used by the composer improvising live)–and visual effects–produced with lights and the participation of the animals. The piece *Taurhiphanie* however is a consequence of the spectacle, being an acousmatic work with materials used the day of the spectacle premiere (at least the pre-recorded material). The spectacle was created July 13, 1987, and the completely fixed acousmatic piece was released on CD only in 1994. The electronics for both spectacle and piece are based on the treatments made by UPIC and the electronic devices developed by the CEMAMu[35]. The spectacle will be described here considering also the percussion works because it was demanding the SIX-XEN (in *Pléïades* and *Idmen A B*), and Xenakis devised a new approach to make this use possible. To achieve it, he summoned two percussion groups with which he had worked the most until then: Les Percussions de Strasbourg and Les Pléiades with Sylvio Gualda. It was thus with thirteen musicians that Xenakis would create a unique acoustic structure and spatial disposition using two Sixxens.

About the initial insights on the piece, the composer stated in a 1989 interview:

> I was asked to create a work which would involve the bulls and horses of the Camargue. Now, bulls are linked with ancient religious tradition in Crete. Remember also Zeus and Europa, Baal in Phoenicia, the Golden Calf of the Jews, who were not monotheistic at the time, as well as Apis, the bull of the Egyptians.
> The idea attracted me strongly, the more so since the bull is such a beautiful animal, so savage still. I accepted the commission on the understanding that the performance would take place in the Roman amphitheater of Arles, where at one time Christians were slaughtered. I asked for a hundred bulls but the organizers got cold feet and only gave me twenty [...] it was a challenge to find out why the bulls sound the way they do... I also loved the horses - they were fine, white animals, so delicate with their long manes and tails. It was a memorable experience. (Varga, 1996, pp. 192-193).

Even if the Radio France Montpellier and the Arles Festivals asked Xenakis to create a work with the theme of both domesticated animals at the Camargue (the region in which Arles is situated), the idea of using real animals on stage did not appear to be the intention of the festivals' organizers. Rather, what occurred at the arena with the animals' live presence and the interaction between instrumental and electroacoustic music is likely in Xenakian approaches to be an original idea of the composer[36]. The composer also did not hesitate to criticize the animal cruelty at this event, as he expressed in an interview with Brigite Massin just before the premiere:

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[35] The *Centre d'Etudes de Mathématique et Automatique Musicales* (known as CEMAMu) was founded by Xenakis in 1972, it was consequence of previews researches developed from 1966 by an informal group that Xenakis named *Équipe de Mathématique et Automatique Musicales* (EMAMu). The CEMAMu developed all over the years many projects on electronic devices and the main one was the UPIC (*Unité Polyagogique Informatique du CEMAMu*). This device was the first interactive tablet relied to a computer that traduced graphic information into sounds, being one of the main accomplishments of the composer in terms of his electronic researches. The UPIC was in its first configuration in 1978, with a finalized version released in 1977 (he would release a second version in 1983, a third with real-time interaction in 1987 and an improved last one in 1991).

[36] A similar event was performed only in 2000 when Pierre Boulez conducted Stravinsky's *Rite of Spring* (1913) and *Symphony of Psalms* (1930) while the company Zingaro, created in 1984 and actually directed by Bartabas (Clément Marty), presented an integral choreography performed by horses without riders. This company, created by Bartabas, pioneered in the beginning of the 1980s what they call the Equestrian Theatre (in French *Théâtre équestre*). It is not clear if the company could have influenced Xenakis in some specific approaches in *Taurhiphanie*, no mention about it was found. However, the company presented their first spectacle (*Cabaret Équestre*) in a great tour from 1984 until 1987,

> *Taurhiphanie* has nothing to do with a death ritual. When the Festival de Radio France Montpellier asked me to think of a new work for them, I remembered that once, in Mycenae, I had set to music this sumptuous place, with its four-thousand-year-old tradition, and that I had set the surrounding hills in motion with processions of goats with luminous horns, led by children and drawing very ancient floral figures on the hillsides. It is in this spirit that I imagined *Taurhiphanie*. [...]
> *Taurhiphanie* should be perceived in this sense, a game of raw nature, of noble character, where I hope my music will marry with the presence of animals, horses and bulls, with wild grandeur, animals symbolic of a region, the Camargue.[37] (Massin, 1987, p. 21).

Xenakis did not support corridas and bullfights, even though it was characterized as a bloodless spectacle at Arles, and his proposition was more so a tribute to life rather than death. As he expressed in a newspaper interview at the premiere: "[to put them to music,] It's always better than putting them to death [...] Bullfights disgust me. I think it is interesting to mix the archaic sounds and cries of animals with the modernity of my music. Ten years ago, I placed lamps on goats for a luminous procession in the night of Mycenae."[38] (F. E., 1987). The composer is then specifying once more the direct connection between *Taurhiphanie* and *Polytope de Mycènes*. In this sense, it is plausible why he intended for the stage to use electronic devices for light and music, and choreographic evolutions of animals simultaneously that many percussionists would play his previous specific pieces. However, the use of two percussion groups this time and the disposition of the musicians would be unique in many ways, as will be further addressed below.

### 4.3.1 The instrumental disposition

As a typical Roman arena structure, the Arles locale offered a central ellipsoidal floor surrounded by stone bleachers (Fig. 4.12). In these conditions Xenakis adapted three elements: a central tower (in which he, his assistants and Sylvio Gualda would be positioned), twelve individual platforms (constructed for each percussionist of Les Percussions de Strasbourg and Les Pléiades in the middle of the bleachers and surrounding the arena floor) and several loudspeakers that would create a sound result that would encompass the entire arena. The audience was then placed between the central area and the circle of twelve percussionists and behind this circle, creating two

passing by many French cities and receiving a very acclaimed diffusion of their work on the press of that period. It is possible that Xenakis was aware of the group before creating his own spectacle with horses and bulls, but nothing until the present could directly connect the composer and this specific company.

[37] "*Taurhiphanie* n'a rien à voir avec un rituel de mort. Quand le Festival de Radio France Montpellier m'a demandé de penser à une œuvre nouvelle à son intention, je me suis souvenu qu'un jour, à Mycènes, j'avais mis en musique ce lieu somptueux, d'une tradition quadrimillénaire, et que j'avais mis en mouvement les collines environnantes grâce à des cortèges de chèvres aux cornes lumineuses, menées par des enfants et dessinant des figures florales très anciennes sur les parois des collines. C'est un peu dans cet esprit que j'ai imaginé *Taurhiphanie*. [...]
*Taurhiphanie* doit être perçu dans ce sens, un jeu de nature brute, de caractère noble, où j'espère que ma musique va se marier avec la présence d'animaux, chevaux et taureaux, à la grandeur sauvage, animaux symboliques d'une région, la Camargue." (Massin, 1987, p. 21).

[38] "C'est toujours mieux que de les mettre à mort [...] Les corridas me dégoûtent. Je crois intéressant de mêler l'archaïsme des bruits et des cris d'animaux avec la modernité de ma musique. Voici dix ans, j'avais placé des lampes sur des chèvres pour une procession lumineuse dans la nuit de Mycènes." (F. E., 1987).

circumferences of auditors (one in front of the main stage and surrounded by the percussionists and the other surrounding the musicians–Fig. 4.12 and Fig. 4.13a).

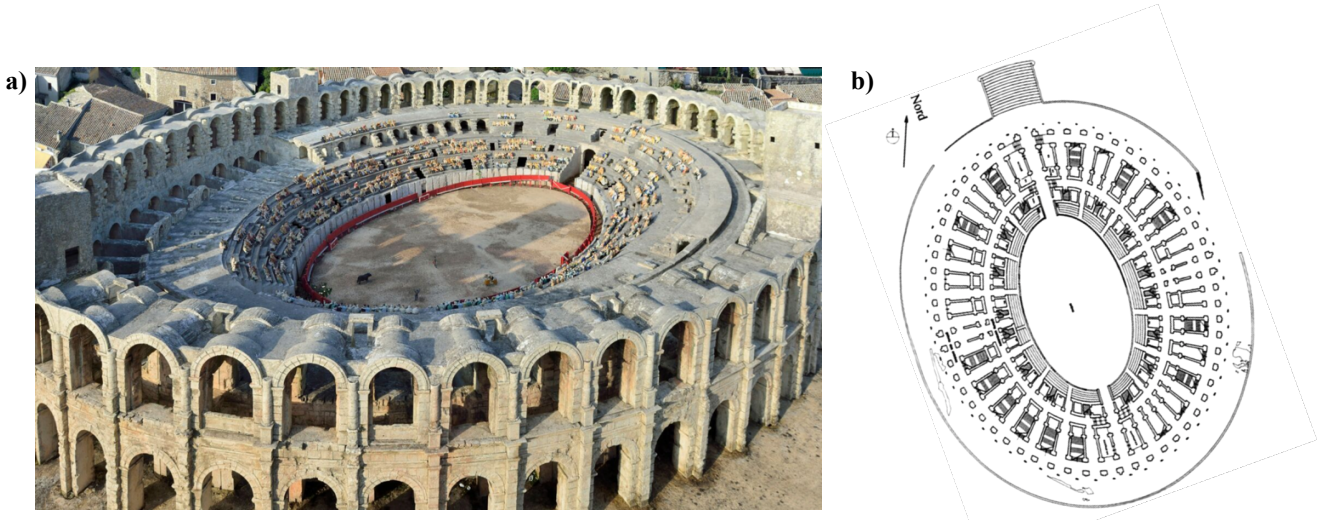


***Figure 4.12***. Architectural structure of the Arles arena. **a)** Aerial photography of the arena. Source: © Lionel Lourdel/Photononstop. **b)** Schematic plan of the architecture of the arena. Source: A.-C. Perrot in Ville d'Arles.

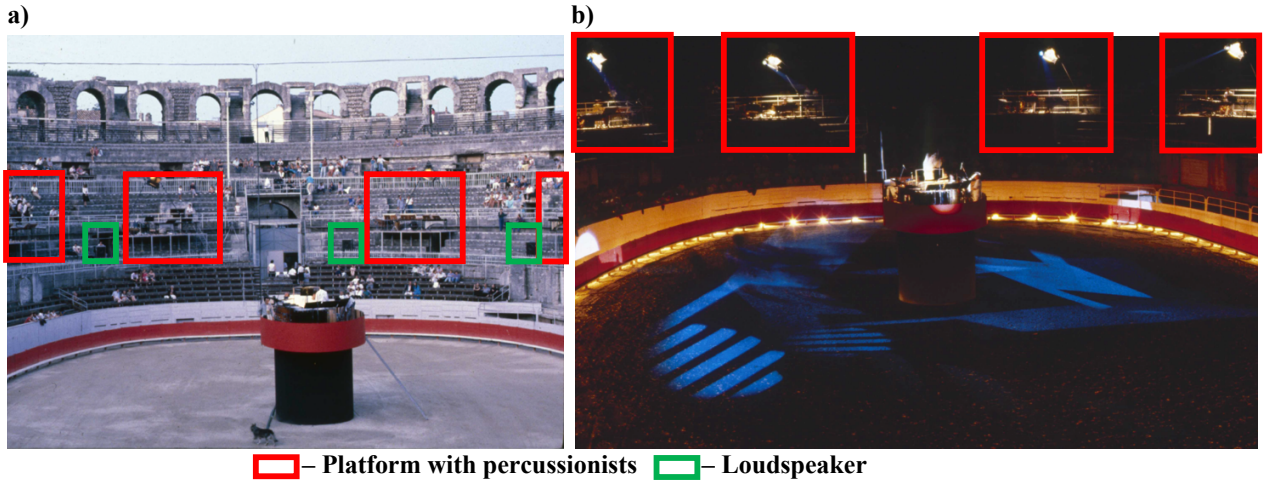


***Figure 4.13***. The instrumental disposition during the spectacle *Taurhiphanie.* **a)** The central tower constructed specifically to the spectacle with four percussion installations and three loudspeakers at the background. **b)** The installations during the spectacle with specific concert lights. Source: © Famille I Xenakis DR.

In a 1989 interview with Varga, Xenakis stated about this disposition:

> We built a wooden tower in the middle of the amphitheater and on top of it, about two or three meters above ground, was a table. The UPIC equipment was placed beneath it, inside the tower, so that I could improvise as the performance was going on. This is now possible with the system. I also had control of the speakers. In addition, there were about twelve percussionists placed all over the arena with the public sitting above them. Six of the players were those of Les Percussions de Strasbourg. The dozen or so performers were conducted very nicely by Sylvio Gualda. *Pleiades* was played, together with another percussion piece. *Taurhiphanie* formed the middle of the programme. (Varga, 1996, p. 192).

Two dispositions were created for the percussionists: a central one at the tower for Gualda as soloist (*Psappha*) and conductor (*Pléïades*) and an ellipse constituted by twelve musicians. The organization of this surrounding disposition is similar to what Xenakis would have preferred for the

premiere of *Idmen A B*, even if only with six musicians (this organization ultimately did not happen). For the spectacle *Taurhiphanie*, the six percussion parts of *Pléïades* (A to F) were organized by pairs in the circle of twelve percussionists (Fig. 4.14 and Fig. 4.15), meaning that the musicians were organized alternately between both groups. Because each percussion group had its own Sixxen prototype, this structure also meant that two prototypes were alternatively disposed, creating an amalgam of two sound characteristics that surrounded the arena. In this year, it is certain that Les Percussion de Strasbourg was using his third prototype, developed by Robert Hébrard, and Les Pléiades was using their first prototype, developed by Bergerault (see more details on Chapter 9). Both prototypes used can be confirmed by consulting the photos of the spectacle.

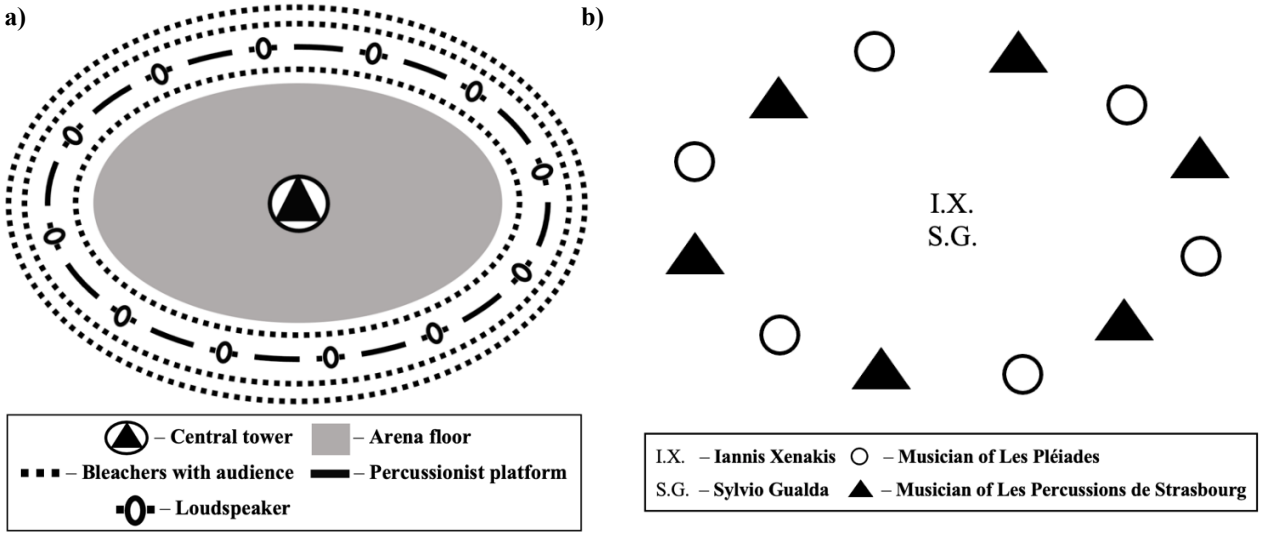


***Figure 4.14***. Disposition of the musicians in the Arles arena for the spectacle *Taurhiphanie* in 1987. **a)** Organization of the scene showing the central tower in the arena floor and the twelve musicians. **b)** Alternating arrangement between Les Percussions de Strasbourg and Les Pléiades surrounding the central tower with Sylvio Gualda, Xenakis and assistants.

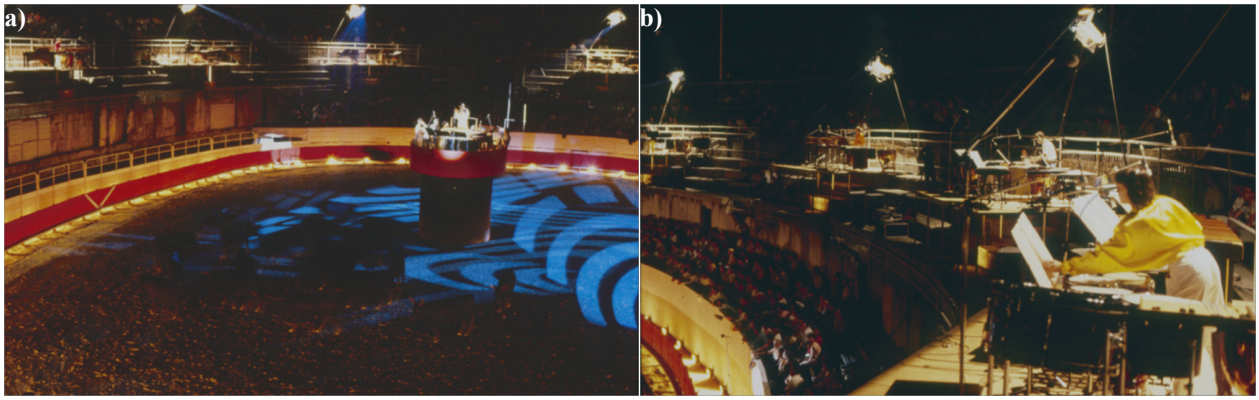


***Figure 4.15***. Images during the spectacle *Taurhiphanie*. **a)** General view of the musicians during the performance of *Pléïades*. Source: © Famille I Xenakis DR. **b)** Image showing the alternance between musicians of Les Pléiades and Les Percussions de Strasbourg, with public at the bottom and at the top of the photo. Source: © Famille I Xenakis DR.

A ring of loudspeakers was disposed with the circle of percussionists between bleachers and surrounding the central arena (Fig. 4.14a). This disposition allowed for the use of twelve loudspeakers

to the diffusion of the piece *Taurhiphanie* and the sound projection of the thirteen percussionists that were being picked up by microphones.

### 4.3.2 The sequence of events

A document archived in the BnF (with identifier CEMAMU 26) is perhaps the first to describe the composer's intentions in relation to the sequence of musical events[39]. It hasn't a precise date but is certainly from 1987 and previously to the spectacle. It shows a list of pieces with which Xenakis imagined the spectacle and its respective subdivisions and durations:

> 12' Horses + IDMEN 6 Strasbourg
> 45' ____ Pléïades 6 + 6 Gualda
> 22' Bulls ____
> 15' Bulls Psappha Gualda[40]

This simple note presents the main ideas that compelled the composer to constitute the sequence of the repertoire surrounding the spectacle in Arles. After this document was written, the composer gave an interview to Brigite Massin in 1987 (just before leaving Paris for the spectacle premiere), in which the same elements and order were again mentioned. As he thus stated:

> The horses enter first, mares with their foals and two stallions held on a leash, it's a parade in the opening, with the accompaniment of the music I had written for *Europa-Cantate* [sic], in Strasbourg, two years ago, *Hymen* [sic]. The horses, however, are not equipped with microphones. It is a presentation in the form of a tribute to beauty, that of the animal.
> Then the horses withdraw. The percussions enter the scene and play, under the direction of Gualda, *Pleïades* [sic], composed in 1978, and as it will be a night of full moon!... Only then do the bulls enter, by mass. They will be between thirty and fifty. Each one wears microphones on horns. At my control desk I have my own music composed for this occasion, a soundtrack of bull noises collected in the Camargue, and the noises, movements and reactions of the bulls on the track. [...] Personally, I retire, together with the bulls, and Sylvio Gualda remains alone in the arena, directing from its center the twelve percussion instruments for an execution of another of my previous pieces, *Psappha*, and the party is over.[41] (Massin, 1987, p. 21).

However, some specifics in this statement appear to be nonapplicable and do not reflect what ultimately happened. For instance, the original idea in which microphones would be positioned in the bulls' horns did not occur at the premiere. The fact that twelve percussionists would play *Psappha*

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[39] This document is stored in a box that includes materials used for the constitution of the tape for the spectacle in 1987. It also contains some material produced after the spectacle in 1988 that is tied to the exclusively acousmatic version of *Taurhiphanie*. This specific collection of the BnF includes rare documents from the CEMAMu.

[40] "12' Chev. + IDMEN 6 Str. / 45' ____ Pléiades 6 + 6 G. / 22' Taur. ____ / 15' Taur. Psappha Gualda"

[41] "Entrent d'abord les chevaux, des juments avec chacune leur poulain et deux étalons tenus en laisse, c'est une parade en ouverture, avec accompagnement la musique que j'avais écrite pour *Europa-Cantate* [sic], à Strasbourg, il y a deux ans, *Hymen* [sic]. Les chevaux, eux, ne sont pas sonorisés. C'est une présentation sous forme d'hommage à la beauté, celle de l'animal. / Puis les chevaux se retirent. Les percussions entrent en lice et jouent, sous la direction de Gualda, *Pleïades* [sic], composée en 1978, et comme ce sera une nuit de pleine lune... ! C'est seulement ensuite qu'entrent les taureaux, par masse. Ils seront entre trente et cinquante. Chacun porte des micros sur des cornes. A mon pupitre de commande je dispose de ma propre musique composée pour cette occasion, d'une bande sonore de bruits de taureaux recueillis en Camargue, et des bruits, mouvements et réactions des taureaux sur la piste." [...] "Personnellement, je me retire, en même temps que les taureaux, et Sylvio Gualda reste seul dans l'Arène, dirigeant de son centre les douze percussions pour une exécution d'une autre de mes pièces antérieures, *Psappha*, et la fête est finie." (Massin, 1987, p. 21).

together while Sylvio Gualda conducted show that he may have been switching either the order or the name of the piece and the way *Taurhiphanie* spectacle was ultimately organized. A possible misunderstanding in the interview transcription by Massin could also have generated this description. Xenakis' furnished description before the spectacle seems to therefore not corroborate the photos and the information founded about the spectacle in sources published at the time. Thus, to describe the sequence of events in the spectacle, photos found at the *Collection Famille Iannis Xenakis* are used here, in addition to all descriptions found about the event along with interviews with people present at the time (Sylvio Gualda, Ewe Payeur and Georges van Gucht essentially). It helped to create a sequence (Figs. 4.16 to 4.20) that narrates the spectacle with images.

The consulted material appears to show that only the ensemble Les Pléiades played *Idmen B* as the first piece of the spectacle (Fig. 4.16), and not the Les Percussions de Strasbourg as Xenakis initially imagined. This piece opened the spectacle and accompanied the entrance of the horses (described as "mares with their foals and two stallions held on a leash" as Xenakis specified but also a mounted rider–Fig. 4.16). As Drillon (1987, p. 74) specifies:

> As the drums thunder, the horses enter. First, two stallions held at the rope, of an unreal whiteness, and not greyish or speckled as the horses from Camargue often are. Then a whole herd, with mares and foals. They remain grouped, terrified by the lights and the rolling fire of the drums and the timbales. Simply accompanied by this rumbling cataract, they appear in all their beauty. [...] A rider, mounted on a stallion with an impeccable bearing, high neck raised very low nose, evolves in school figures, backwards, in crayfish... But very quickly, by big movements. And the whole herd turns slowly.[42]

Then, with the horses yet present on the arena, Sylvio Gualda played *Psappha* (Fig. 4.17). Drillon (1987, p. 74) presents again a good source of information because he described the passages in more detail, stating that "Gualda makes his grand solo, from the top of the tower, and all the spotlights converge on him. Each hit is doubled by a powerful echo. Thus, we obtain an uninterrupted sequence of pairs"[43]. He seems to mention that Xenakis may have treated the signal received by the Gualda's microphones and spatialized some passages of *Psappha* with the loudspeakers present in the arena. At the end of the piece, the horses exited and the bulls entered (Fig. 4.18) to the sound of *Taurhiphanie* (in this moment yet an electronic improvisation made by Xenakis on live with a mix of prerecorded and live sounds).

> [...] shortly afterwards, illuminated by six beams of light producing zebra-shaped spots on

[42] "Alors que tonnent les percussions, entrent les chevaux. D'abord, deux étalons tenus à la longe, d'une blancheur irréelle, et non point grisâtres ou mouchetés comme le sont souvent les camarguais. Puis tout un troupeau, avec juments, poulains. Ils restent groupés, terrifiés par les lumières et le feu roulant des tambours et des timbales. Simplement accompagnés par cette cataracte grondante, ils apparaissent dans toute leur beauté. Les camarguais sont moins fins que les autres chevaux, mais plus arrondis, plus féminins. [...] Un cavalier, monté sur un étalon au port impeccable, encolure haut levée nez très bas, évolue en figures d'école, à reculons, en écrevisse... Mais très rapidement, par grands déplacements. Et tout le troupeau tourne lentement." (Drillon, 1987, p. 74).

[43] "Gualda fait son grand solo, du haut de la tour, et vers lui convergent tous les projecteurs. Chaque coup frappé est doublé par un écho puissant. On obtient ainsi une suite ininterrompue de paires" (Drillon, 1987, p. 74).

> the sand, the bulls, about twenty of them, come out. Then begins a fabulous music, made of roars that sometimes become sirens, of big continuous rises, crescendo, kind of big variation on the... bull's song. A single picador is there, mounted on a very fine chestnut, who watches them and does not stop moving like the previous one. The bulls, agitated and snarling, go in a dislocated herd. Some scratch the ground, others stare at the audience with their own darkness, others pee placidly. They gallop away at the slightest solicitation, at the slightest threatening gesture from the picador.[44] (Drillon, 1987, p. 74).

After the end of this improvisation, the twelve percussionists presented *Pléïades* with Gualda directing from the center, with the bulls still present at the arena (Figs. 4.19 and 4.20). Gathering all information about the concert, the sequence of movements appears to have been: «*Métaux*», «*Claviers*», «*Peaux*» and «*Mélanges*». The description produced here is accompanied by the Figs. 4.16 until 4.20 that present a sort of photo essay of the spectacle and that is synthesized in the Table 4-4, by comparing Xenakis' interview in 1987 and the sequency here exposed. The photos convey many details about the spectacle, and the presentation of this sequence of images depicts how the sequence of events constituted an immersive spectacle to the public.

**a)** **b)**

**– Platform with percussionist playing *Idmen B*; – Platform with percussionist not playing *Idmen B***

***Figure 4.16***. Photo essay 1 of *Taurhiphanie*. **a)** and **b)** Entrance of the horses and performance of Idmen B by the ensemble Les Pléiades. Source of both: © Famille I Xenakis DR.

[44] "[...] peu après, éclairés par six faisceaux de lumière produisant sur le sable des taches zébrées, déboulent les taureaux, une vingtaine. Alors commence une musique fabuleuse, faite de mugissements qui se font parfois sirènes, de grandes montées continues, crescendo, sorte de grande variation sur le... chant du taureau. Un picador unique est là, monté sur une alezane très fine, qui les surveille et ne cesse de se déplacer comme le précédent. Les taureaux, agités et hargneux, vont en troupeau disloqué. Certains grattent le sol, d'autres fixent le public avec noirceur qui leur est propre, d'autres pissent avec placidité. Ils partent au galop à la moindre sollicitation, au moindre geste de menace du picador." (Drillon, 1987, p. 74).

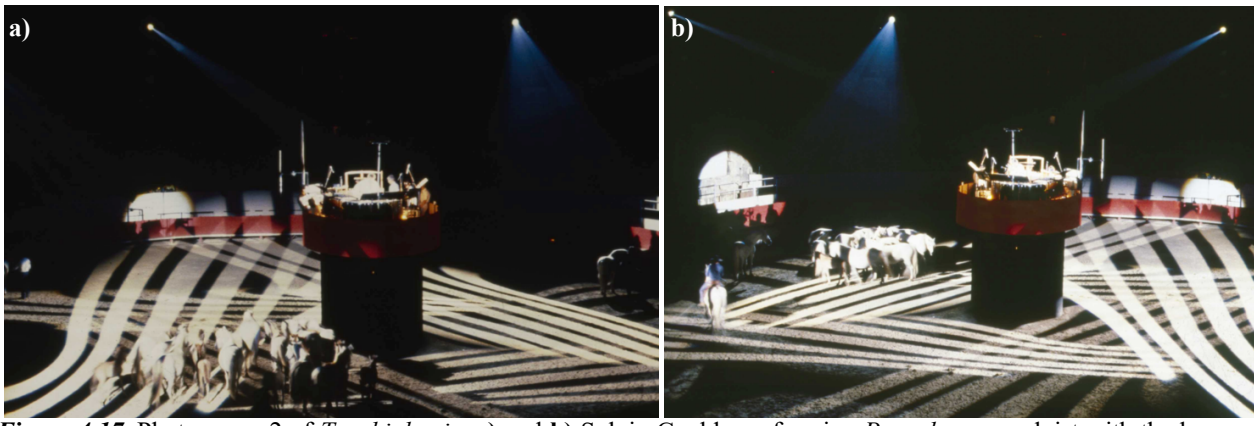


***Figure 4.17***. Photo essay 2 of *Taurhiphanie*. **a)** and **b)** Sylvio Gualda performing *Psappha* as a soloist with the horses still on the arena. Source of both: © Famille I Xenakis DR.

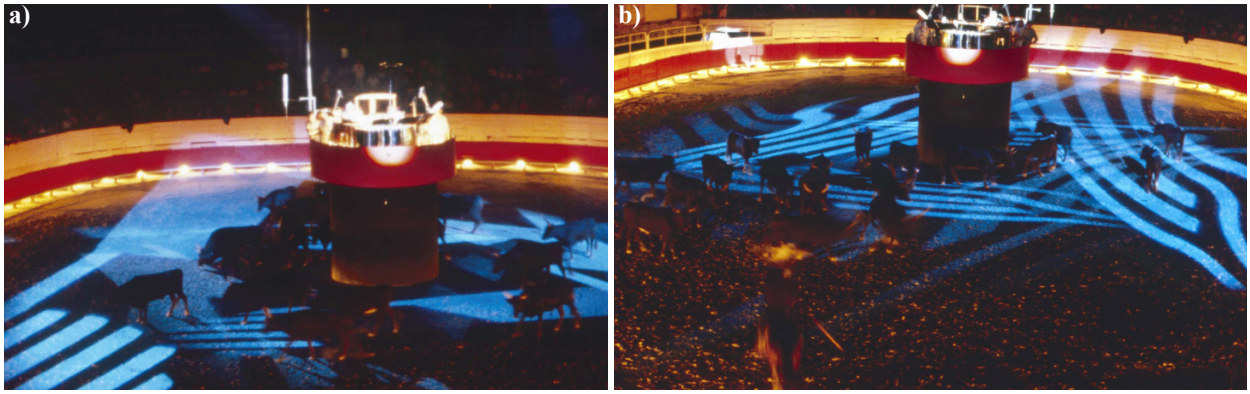


***Figure 4.18***. Photo essay 3 of *Taurhiphanie*. **a)** and **b)** Entrance of bulls and performance of the first version of the electronic piece *Taurhiphanie*. Source of both: © Famille I Xenakis DR.


***Figure 4.19***. Photo essay 4 of *Taurhiphanie*. **a)** and **b)** Performance of *Pléïades* with Sylvio Gualda conducting. Source: © Famille I Xenakis DR.

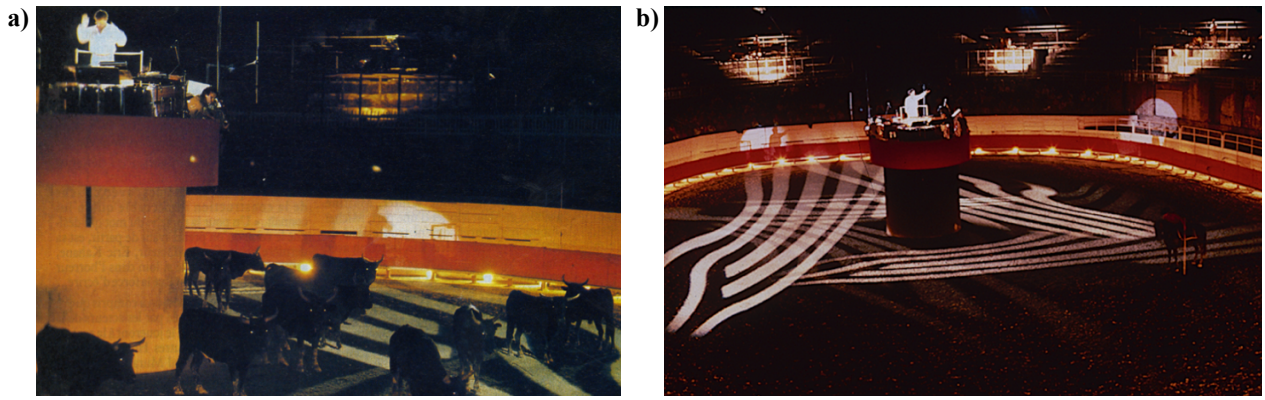


***Figure 4.20***. Photo essay 5 of *Taurhiphanie*. **a)** Performance of *Pléïades* with Sylvio Gualda conducting. Source: Drillon (1987), © Le Nouvel Observateur. **b)** End of the spectacle with bulls still present in the arena. Source: © Famille I Xenakis DR.

***Table 4-4***. Sequence of events in *Taurhiphanie* and comparison between Xenakis' first plan made and the premiere.

| | **Actions with horses or bulls in the arena** | **Sequence as described by Xenakis** (Massin, 1987, p. 21) | **Sequence verified with photos and descriptions of the period** |
|---|---|---|---|
| **Event 1** | Entrance of horses | 1 – *Idmen* (not clear which part if *A* recorded or *B* live) | 1 – *Idmen B* (only with Les Pléiades)<br>2 – *Psappha* (Sylvio Gualda as soloist) |
| **Event 2** | Horses exit | 2 – *Pléïades* | |
| **Event 3** | Entrance of bulls | 3 – *Taurhiphanie* | 3 – *Taurhiphanie*<br>4 – *Pléïades* (Les Percussions de Strasbourg + Les Pléiades, Sylvio Gualda conducting) with the order: «*Métaux*», «*Claviers*», «*Peaux*» and «*Mélanges*» |
| **Event 4** | Bulls exit | 4 – *Psappha*<br>(Sylvio Gualda conducting) | |

The animals were intended to physically move more than what happened in the area. As expressed by Harley (2004, p. 187), "The animals would create dynamic stochastic patterns to complement both the patterns of lights projected down into the ring and, of course, the music." However, due to the overstimulation of events around them (including sounds, lights, people and the heavy structures), the animals presented a meek and timid composure unlike what was originally written. As a result, many critics were tenacious toward Xenakis' spectacle; however, although if the spectacle would never be repeated again, the composer finished an acousmatic piece some years later from the material produced for and during the spectacle.

### 4.3.3 The music

It is necessary to separate two different parts of the spectacle *Taurhiphanie* to understand the music that Xenakis organized specifically during the event. Firstly, the electronic improvisation had the same name of the spectacle and was specially developed at the occasion, being later the inspiration for a new fixed acousmatic piece (finished in 1988 and released in CD format in 1994). Secondly, the acoustic music played that involved exclusively his percussion repertoire, in which the SIX-XEN was used in two of three pieces.

Xenakis composed many electroacoustic pieces[45] but only four pieces on UPIC: *Mycènes Alpha* (1978), *Pour la Paix* (1981), *Taurhiphanie* (1987-1988) and *Voyage absolu des Unari vers Andromède* (1989). During the spectacle, the intermediary acousmatic part was developed based on pre-recorded sounds of bulls from the Camargue, and the main idea was to mix this part with the live sounds collected by the animals on the arena. To capture this live, the composer intended to install

[45] Xenakis' production of electroacoustic music was divided into three phases by Hoffman (2015) who compared his electroacoustic production with the orchestral pieces of the respective time. For him, it could be classified as works from the 1950s and 1960s (a production influenced by the researches at the GRM and the Concrete approach on sound treatments), from 1967 until late 1970s (when several *Polytopes* were carried out and with a climax on the early 1970s) and those from late 1970s and the 1980s (composed with UPIC).

microphones on the bulls' horns but this proved impossible during the spectacle. This aspect of having microphones on bull horns is misunderstood because although some authors affirm that this idea occurred (such Fleuret, 1988; Harley, 1998; Sterken, 2003), others did not. As Fleuret (1988, p. 185) explained, "For the first time he decided to manipulate live a previously recorded magnetic tape, based mainly on animal sounds, the sounds produced by twenty or so bulls and picked up by a microphone placed in the middle of the horns, and also to compose on the spot with the UPIC."[46] It is likely that the composer tried to capture some live sounds with microphones with ambience microphones instead of his original idea. As the composer himself stated about it:

> [The animals] moved around. I had wanted to put microphones on their heads and behinds in the hope that they would make some noise. In the event they were very quiet... I was disappointed. That's why I imitated the sound of the bulls in the piece, because I knew there was no chance of the real thing. (Varga, 1996, p. 192).

Thus, the pre-recorded sounds and the live capture was the material to an improvisation by the composer[47]. As he explained in the above interview (Varga, 1996, p. 192), the UPIC equipment was placed at the central tower in the middle of the arena floor where the composer was also situated, and he could improvise as the performance was going on. The application of the UPIC in the live performance was possible in the mid-1980s and *Taurhiphanie* was the first time he attempted this technique. Thus, the composer had the possibility to create live electronics with the UPIC while he was also controlling many parameters of the loudspeakers with a sound table[48]. Couprie (2020, p. 439) affirms in further detail:

> The work included fixed and improvised parts from sixty fragments manipulated in real time by playback with variation of sequences and by effects such as freezing or reverse. In the original concept, the bulls were to be equipped with high frequency (HF) microphones to capture their breathing; the UPIC would then also have been used to manipulate these sounds in real time. It turned out that the lack of rehearsal time and the movement of animals, which was difficult to control because of the intensity of the sounds diffused, led Xenakis to use prerecorded live sound playback.

Consulting the recorded material of Xenakis in the BnF (*Bibliothèque nationale de France*), ten references appeared for *Taurhiphanie* (DONAUD 0604: 1 – Xenakis 1, 2 – Xenakis 2, 3 – Xenakis 3, 4 – Xenakis 4, 44 – Xenakis 47, 133 – Xenakis 136, 314 – Xenakis 323, 432 – Xenakis 446, 433 –

[46] "Per la prima volta decideva di manipolare in diretta un nastro magnetico preventivamente registrato, e basato soprattutto su versi d'animali, i suoni prodotti da una ventina di tori e captati da un microfono piazzato in mezzo alle corna, ed anche di comporre sul momento con l'UPIC." (Fleuret, 1988, p. 185).

[47] "At my control desk I have my own music composed for this occasion, a soundtrack of bull noises collected in the Camargue, and the noises, movements and reactions of the bulls on the arena floor." As originally stated: "A mon pupitre de commande je dispose de ma propre musique composée pour cette occasion, d'une bande sonore de bruits de taureaux recueillis en Camargue, et des bruits, ouvements et réactions des taureaux sur la piste." (Massin, 1987, p. 21).

[48] About it the composer also stated: "What interests me is that I am free to choose, my score allows me multiple paths, I can improvise on elaborate structures, and of course mix the elements at my convenience." As originally published: "Ce qui m'intéresse c'est que je suis libre de mes choix, ma partition me permet des parcours multiples, je peux improviser sur des structures élaborées, et bien entendu mixer à ma convenance les éléments." (Massin, 1987, p. 21).

Xenakis 447, 726 – Xenakis 773). These references (Table 4-5) show an array of tapes that include the original sounds of bulls recorded in the Camargue, different stages of stereo material that was produced for the spectacle and the many steps to achieve a final version of the acousmatic piece finished in 1988[49]. Unfortunately, none of the consulted archives have information on whether the spectacle was recorded on that day.

***Table 4-5***. Iannis Xenakis' recordings of *Taurhiphanie* archived at the *Bibliothèque nationale de France* (BnF).

| Identification | Name | Indication about the tape | Specifics |
|---|---|---|---|
| **DONAUD 0604 1 –Xenakis 1** | *Taurhiphanie* 13 July 1987, Arles | | 7' – 38cm/s (Pyral?) original |
| **DONAUD 0604 2 –Xenakis 2** | *Taurhiphanie* 27/10/1988, CEMAMU (with Fabrice Arnaud) | "commande du Festival d'Arles, du Festival de Montpellier et de Radio France (13/07/87)" | 7' – 38cm/s (stereo) master copy |
| **DONAUD 0604 3 –Xenakis 3** | *Taurhiphanie* (track 1) 27/10/1988 | "Taurhiphanie (piste 1)" | 5' – 38cm/s; Track 1 copy |
| **DONAUD 0604 4 –Xenakis 4** | *Taurhiphanie* (track 2) 27/10/1988 | "Taurhiphanie (piste 2)" | 7' – 38cm/s; Track 2 copy |
| **DONAUD 0604 44 –Xenakis 47** | *Taurhiphanie* CEMAMU, 23/11/88 (with Fabrice Arnaud) | "Copie master de la bande CEMAMU du 27/10/88, cotée Xenakis 2 (commande du Festival d'Arles, du Festival de Montpellier et de Radio France du 13/07/87)" | 7' - 38 cm/s stereo |
| **DONAUD 0604 133 –Xenakis 136** | *Taurhiphanie* October 1988 | | 7' – 38 cm/s stereo |
| **DONAUD 0604 314 –Xenakis 323** | *Taurhiphanie* (mounted bulls sequence tape) CEMAMU Paris, 28/06/87 | "the selected bulls sequence are mounted here; we used this tape to produce the 8 - track version at Guy - Noel's, 28/06/87" | 5' – 38 cm/s |
| **DONAUD 0604 432 –Xenakis 446** | *Taurhiphanie* (right track) CEMAMU 13/07/1988 | "version non finale; prêt pour le montage avec amorces puis mixage" | 10 1/4 in – 38 cm/s |
| **DONAUD 0604 433 –Xenakis 447** | *Taurhiphanie* (left track) CEMAMU 13/07/1988 | "version non finale; prêt pour le montage avec amorces puis mixage" | 10 1/4 in – 38 cm/s |
| **DONAUD 0604 726 –Xenakis 773** | *Taurhiphanie* Octobre 1988 | | Cassette tape |

The second musical element of the spectacle was characterized by the acoustic pieces performed by both percussion groups[50] and Sylvio Gualda as a soloist and conductor. In this perspective, three pieces were presented: *Idmen B*, *Psappha* and *Pléïades*. The Sixxen prototypes

[49] Among the records, the material classified as DONAUD 0604 314 – Xenakis 323 shows a sequence of the bulls' sounds originally recorded, without any electronic treatment. The material carries the description mentioning "the selected bulls sequence are mounted here; we used this tape to produce the 8 - track version at Guy - Noel's, 28/06/87". This is then maybe a material that Xenakis just diffused during the event to give the impression that it was the live sound of the animals. The next interesting material in the archives is DONAUD 0604 1 – Xenakis 1 because this could be the pre-recorded and treated material used during the improvisation in Arles the 13 July, 1987. Then, some records are tied to the development of the piece *Taurhiphanie*, as its final master copy archived (DONAUD 0604 44 – Xenakis 47). It is indicated thus that this master copy was accomplished with Fabrice Arnaud at the CEMAMU the 23 November, 1988 based on a tape of the 27 October, 1988 (DONAUD 0604 3 – Xenakis 3 and DONAUD 0604 4 – Xenakis 4 as independent tracks or DONAUD 0604 2 – Xenakis 2 as a stereophonic master copy of the two previous). The records DONAUD 0604 432 – Xenakis 446 and DONAUD 0604 433 – Xenakis 447 are intermediary treatments of July 1988 and DONAUD 0604 133 – Xenakis 136 and DONAUD 0604 726 – Xenakis 773 of October 1988.

[50] The references about that spectacle are not always clear and correct about the percussionists. Some expressed that the percussion group was only Les Percussions de Strasbourg, others only Les Pléiades. However, with the photos of the premiere many details are verifiable in terms of musicians, disposition, lights and sections of the spectacle.

used for the occasion were the first prototype of Les Pléiades (developed with Bergerault) and the third of Les Percussions de Strasbourg (developed by Robert Hébrard). *Idmen B* and *Pléïades* both used the instrument the first of which being characterized by only one prototype and the second by both prototypes simultaneously, which was unique in all the material found until now.

*Idmen B* was presented only by Les Pléiades and without conducting, which was an extremely difficult condition of synchronization for the ensemble. To solve this issue, they used a click track, which have also happened with *Pléïades*. Many photos from that night show Gualda conducting from the central tower; however, in a space as massive as this arena, there were likely many problems with the rhythmic precision of the attacks (not including issues due to doubled parts). As the Fig. 4.21a shows, the use of headphones to diffuse a click track appears to have been crucial in *Pléïades* to synchronize twelve musicians stationed throughout the arena. The image shows a musician of Les Pléiades using headphones in the exact moment of the performance of «*Mélanges*» (as determined by the instruments used by her and the musician of Les Percussions de Strasbourg in the background). All percussion instruments were amplified with the use of microphones (Fig. 4.21) and diffused by the several loudspeakers scattered around the arena (Fig. 4.21b). This allowed a general and constant amplification of the instruments but also a spatialized and specific diffusion at certain moments of the spectacle, as what potentially occurred during *Psappha*.

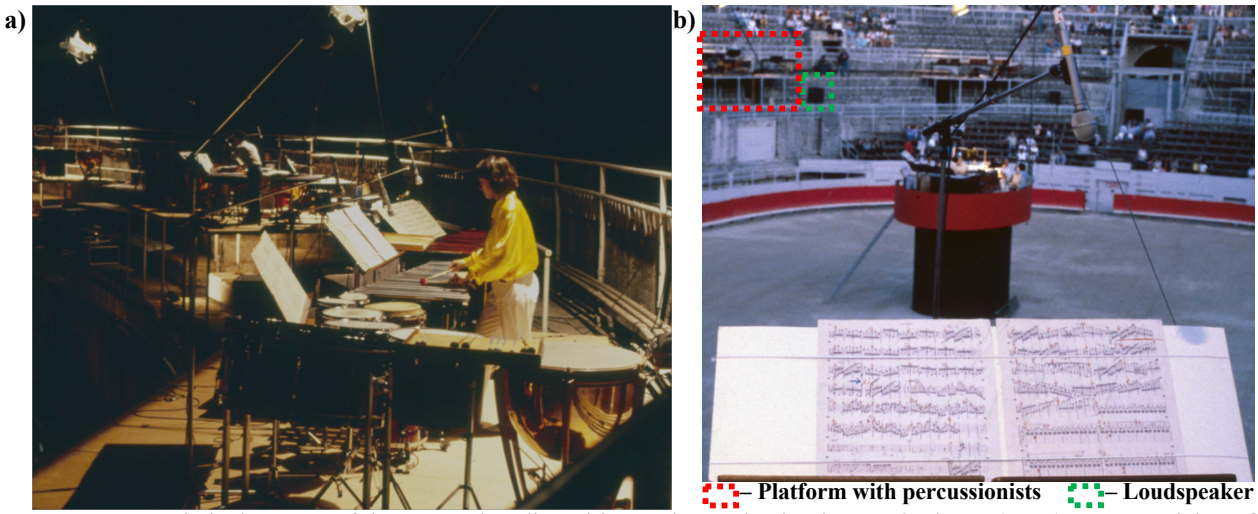


***Figure 4.21***. Technical aspects of the percussion disposition and organization in *Taurhiphanie* (1988). **a)** A musician of the Les Pléiades ensemble using headphones. **b)** The use of microphones to capture the percussion instruments (at the top of the foreground) and the disposition of the percussion set-up with a loudspeaker that occurred for each one of the twelve musicians (at the left top of the background). Source of both: © Famille I Xenakis DR.

Even without a new score for the SIX-XEN, *Taurhiphanie* represented an innovative notion in terms of its practical application. The use of two prototypes simultaneously could show how Xenakis freely applied the instrument, putting into evidence the fact that for him, a determinant frontier between prototypes could not exist. Independent of the metallic material, shape of the bars, timbre

and frequencies, the Sixxens could be applied together as a continuous variation of the same spectrum. There would be a continuity in the acoustic effect that makes them part of the same phenomenon, independent of fabrication and specific construction decisions.

This spectacle was not entirely well received, at least by many critics at the time. Harley (1998, p. 63) stated that "The spectacle received bad press reviews and may be described as Xenakis's single dramatic failure." The press released commentaries about the event, as found at the *Le Monde* (1987):

> Even highlighted by superb frames of azure lights, right on the sand of the arena, this living decor of flesh and horns seemed to lend itself with indifference to some smoky animal simulacrum, less stimulated than passively directed by the placid evolutions of a rider. As what, after all, the aficionados of Arles were not entirely wrong in their frank reticence towards the project (hence the fact that only two thousand or three thousand spectators rallied the arenas when one hoped for nearly the triple?)[51]

Because several other critiques were negatives and because the acousmatic piece was released as a final fixed version of *Taurhiphanie*, several details of the spectacle were set aside and even forgotten[52]. The improvisational character of the original piece, that was not repeated by Xenakis, was also forgotten by some authors because of the fixity of the posterior version. However, even with a tepid reception, the spectacle represented a completely new artistic experiment in contemporary music by combining horses, bulls and avant-garde music.

In terms of his SIX-XEN use, it is necessary to underline two important aspects related to this spectacle. Firstly, Xenakis used a mixed formation of 2 Sixxens, creating a situation in which the tuning and timbre characteristics was developed by a collection of 228 pitches. This was the first and possibly only project until now that accomplished this feat. Secondly, he composed the spectacle as a mix of acoustic and electroacoustic pieces. Even if the interaction between the Sixxens and the electroacoustic material was successive, a proposition with a simultaneous one, as a sort of association of his instrument and electronics would be the next step of Xenakis' intent to use his instrument.

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[51] "Même mis en valeur par de superbes trames de lumières azurées, à même le sable de l'arène, ce décor vivant de chair et de cornes semblait se prêter avec indifférence à quelque fumeux simulacre animalier, moins stimulé que passivement dirigé par les placides évolutions d'un cavalier. Comme quoi, après tout, les aficionados arlésiens n'avaient pas entièrement tort dans leurs franches réticences à l'égard du projet (d'où le fait que deux mille ou trois mille spectateurs seulement aient rallié les arènes quand on en espérait près du triple ?)" (Le Monde, 1987).

[52] As Harley (2004, p. 188) stated, "While there is a certain roughness to *Taurhiphanie* that might indicate a lack of finesse in the shaping of certain details, there is nonetheless an assurance and cohesion that carries the music beyond the limitations of its production. When the somewhat lame presentation in Arles has been long forgotten, the music will live on. Xenakis, in any case, was preoccupied with another event coming up, during that busy summer of 1987." The author is mentioning here the outdoor staging in August 1987 of the *Oresteïa* suite at the ancient village of Gibellina in Sicily (Italy).

## 4.4 *Introduction aux droits de l'homme et de l'automate – Ballet de robots émancipés* (1988)[53]

A project that Xenakis never finished but could have potentially presented a new score with a Sixxen will now be discussed. Interestingly, this spectacle would represent an amalgam of previous approaches with percussion instruments, new technologies, and visual effects with light and lasers. The project would then include the only choreography completely developed by Xenakis in a new ambitious and grandiose project, as the previous *Polytopes*. The main focus here was the technology as a source of artistic interest, but also as a discussion about artificial intelligence and the rights of artificial beings in a clear futuristic vision and approach. Because in Xenakis' point of view, clear restrictions were imposed to the dance as consequence of the physical and natural limitations of the human, and through this lens, he sought to develop this new spectacle with automatons. He wrote the original project in French in 1988 and progressively translated the work while working towards full funding until 1991.

In the *Collection Famille Iannis Xenakis*, three versions of this project[54] were found in German (OM 32-2), in French (OM 32-5) and in Italian (OM 32-6). They are from different years, being the French and Italian projects from 1988 or beginning 1989 and the German from 1990 to be realized during the season 1992-1993. These texts show that the initial idea of Xenakis was clearly delimited and in need of financial support to develop it in terms of practical achievement. Different institutions showed an initial support. For instance, in 1988-1989, the French (OM 32-5) and Italian projects (OM 32-6) included supporting institutions such as the *Association Amici di Villa Medici* with ROMAEUROPA Festival and the *Accademia di Francia a Roma*, Gulbenkian Foundation, Lille Festival and the Mission for the Bicentenary of the French Revolution and the Declaration of the Human and Citizen Rights[55]. In 1990, the German project (OM 32-2) also included Almeida Festival (London), *Alte Oper* (Frankfurt), SNCF (French railroad company), *Hamburg Staatsoper* and *Festival Musica* (Strasbourg). Even with institutional support, a crucial element was still missing: a heavy financial investment and the direct partnership with an automobile industry to furnish the automatons. This search included many European automobile factories, such as Renault, Fiat, Volkswagen, Audi and Daimler as seen in several documents, letters and exchanges[56].

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[53] There are rare articles about this unfinished spectacle, some aspects are addressed by Harley (2014) and Lohner (2020).
[54] The *Collection Famille Iannis Xenakis* contain projects, manuscripts, sketches, drawings, flyers about machines, and texts about this spectacle, essentially grouped and classified as OM 32. The German project is intitled "*Einfürhung in die Rechte der Menschen und der Automaten. Ein Ballet für emanzipierte Roboter*" and the Italian "*Introduzione ai Diritti dell'Uomo e dell'Automa (Balletto dei Robots Emancipati)*".
[55] Originally called *Mission du Bicentenaire de la Révolution Française et de la Déclaration des Droits de l'Homme et du Citoyen* in French.
[56] Asking for meetings and support to the project, Xenakis personally contacted the President and CEO of Renault Automation (*Président Directeur Général de Renault Automation*) and Director of the City of Science and Industry (*Cité*

### 4.4.1 The initial project and sources of inspiration

The project may have been inspired by a cycle of conferences in which Xenakis participated in the beginning of 1988. The cycle "*La fabrique du corps humain et les droits de l'Homme*" occurred from March 1987 until June 1988 at the *Centre Georges Pompidou*. Xenakis kept a conference program in his personal archives (showing lectures on April 27, May 4 and 18 and June 1, 1988) and it is not clear if the composer participated in the entire cycle or only in the conclusion (with the topics Crimes against Humanity, Ethics and Rights, Nuremberg Code). Although the conference cycle focused primarily on human rights and the ethical and legal issues of biological and medical research with the human species, there were topics on artificial intelligence, automation of industrial processes and the mechanization of work. It is evident that he participated in this event to reference these topics in the *Ballet de robots émancipés* project, because the initial drafts show that the first concept originated as early as least February 21, 1988 (OM 32-1), with a notepad this date containing a drawn and textual brainstorm of the concept. Different models of automatons and the concepts with light and laser are indicated (Fig. 4.22a and b). An image depicts the interest in associate UPIC and percussion in the same spectacle (Fig. 4.22c) and in this same notepad he appears to assign a title to the project for the first time, such as "*Ballet de robots émancipés. Introduction ~~des~~ aux droits ~~du robot~~ des automates*." (Xenakis notes in OM 32-1, p. 9). The general date around which he's producing this material is seen on page 7 (Fig. 4.22d) that includes a summary of ideas and concepts described as:

Slavery - Liberation
human → servant machine
machine → human serving
rights - simultaneous writing human rights
genetic machine → human machines
human-machines + human-human = andromachines
on to breeding
babies ← woman + machine
war-art-science philosophy → reasoned conquest collaboration with cosmos[57]

*des Sciences et de l'Industrie*) in May 27 1991.

[57] "Esclavage – Libération / homme → machine servante / machine → homme servant / droits – écritures simultanées droits de l'homme / machine génétique → hommes machines / hommes-machines + hommes-hommes = andromachines on to breeding / bébés ← femme + machine / guerre-art-science philosophie → conquête raisonnée collaboration avec cosmos" (Xenakis, OM 32-1, p. 7).

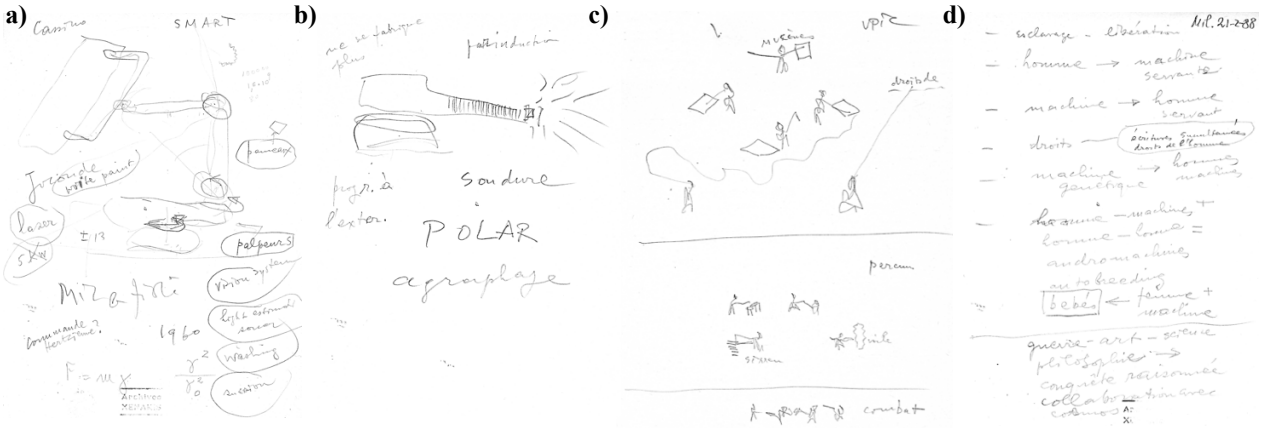


***Figure 4.22***. Sketches and notes on initial concepts about the project *Introduction aux droits de l'homme et de l'automate – Ballet de robots émancipés* (1988). **a)** Robotic arm model as first source of inspiration to the project. **b)** Light or laser device attached in a robotic arm. **c)** Part of the stage or the activities surrounding the use of the robotic arm. **d)** Brainstorm on futuristic terms and concepts surrounding the project. Source: © Famille I Xenakis DR (OM 32-1, pp. 1, 3, 6 and 7).

The spectacle initially indicated in this notepad amasses a production on a much larger scale using robotic arms, light and laser devices, with performers. It strongly correlates with the approaches and aesthetics that the composer had already been developing since 1967 with the *Polytopes*. The main drawings and the entire project took shape around April 1988, when the composer fixated on a type of automaton with four mobile segments and calculated the possible movements that could be achieved with robotic arms and the available amplitude (Fig. 4.23).

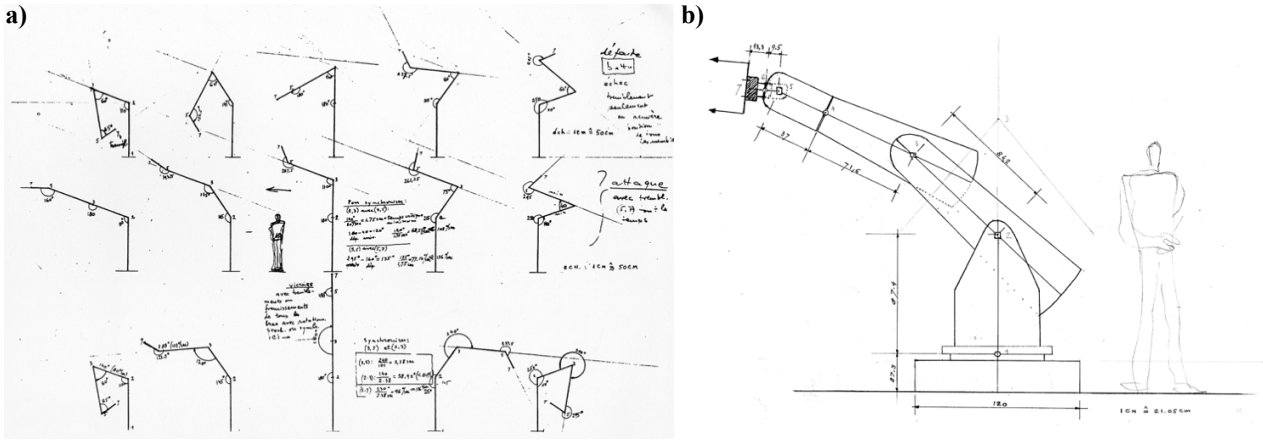


***Figure 4.23***. Initial studies for Xenakis' choreography using robotic arms. **a)** Final positions and angles of interest to create the choreography with robotic arms. **b)** Study of the size and the disposition of parts of a four mobile segments robotic arm. Comparative human scale is provided in both. Source of both: © Famille I Xenakis DR (OM 32-3, pp. 22 and 7).

Also around that time, he started to organize sections and create a general development of the robotic movements. As Xenakis written:

> 5? 7? Synchronous or free robots?
> Phase I: each arm, with its <u>own max</u> speed, oscillates in its <u>own max</u> amplitude, with spotlights at the ends
> Phase II: each arm with <u>sieved</u> speed oscillates in its <u>own max</u> amplitude

> Phase III: each arm with <u>own max</u> speed oscillates with <u>logistic</u> amplitude
> Phase IV: each arm with <u>sieved</u> speed oscillates with <u>logistic</u> amplitude
> Phase V: each arm with <u>logistic</u> speed oscillates with <u>logistic</u> amplitude[58] (Xenakis' notes in OM 32-3, p. 6).

He then finalized the amount and specific model of automatons that could be on stage (nine unities of SMART 6.50 R) as shown on a drawing of the April 17, 1988 (Fig. 4.24) and mentioned with other details in the French project as:

> Nine SMART 6.50 R, arranged more or less irregularly in plan. The public is surrounding. The spectacle lasts from 20 to 30 minutes, renewable for several hours, with sufficient interludes to let the public out and/or in.
> Flat surface (solid floor) with shelter: shed, disused factory, public place so that the spectacle can be itinerant throughout the year.
> Provide lighting on and off the robots. Sound diffused by loudspeaker among the robots and/or around the public.
> The music will be on multi-track tape with three UPIC tables on which the robots will improvise music.
> Lighting, movement of the robots, music and its diffusion will be entirely automated.
> Eventually a percussionist will be added.[59] (Xenakis' notes in OM 32-5, p. 6).

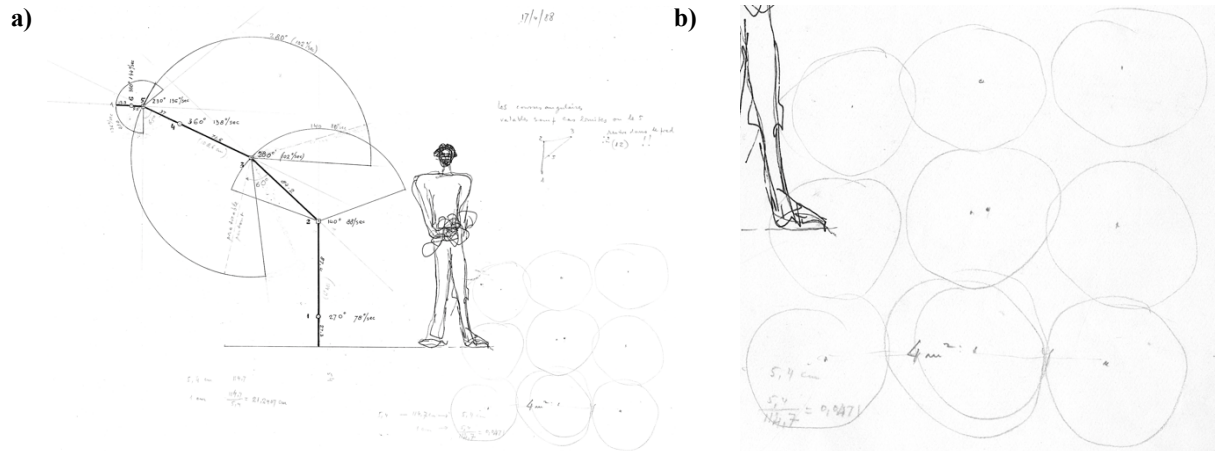


***Figure 4.24***. Initial studies for Xenakis' choreography using robotic arms. **a)** Range of vertical, horizontal and rotational movements tied to the angles of a four segments robotic arm. Comparative human scale is provided. **b)** Detail of the previous drawing showing the final number of robotic arm and their potential disposition on stage. Source: © Famille I Xenakis DR (OM 32-3, p. 8).

The use of light and laser devices was imagined as attached to the tip of industrial robotic arm, thus being an extension of the device (Fig. 4.25a). This could create visual effects such as those achieved in some *Polytopes* (Fig. 4.25b).

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[58] "5 ? 7 ? Robots synchrones ou libres ? / Phase I: chaque bras, avec sa vitesse <u>propre max</u> oscille dans son ampl. <u>propre maxi</u> avec loupiottes aux bout / Phase II: chaque bras avec vitesse <u>criblée</u> oscille dans son amplitude <u>propre max</u> / Phase III: chaque bras avec vitesse <u>propre max</u> oscille avec amplitude <u>logistique</u> / Phase IV: chaque bras avec vitesse <u>criblée</u> oscille avec amplitu <u>logistique</u> / Phase V: chaque bras avec vitesse <u>logistique</u> oscille avec ampl <u>logist</u>" (Xenakis' notes in OM 32-3, p. 6).

[59] "Neuf SMART 6.50 R, disposés plus ou moins irrégulièrement en plan. Le public est autour. Le spectacle dure de 20 à 30 minutes, renouvelable plusieurs heures avec des interludes suffisants pour faire sortir et/ou entrer le public. / Surface plane (plancher solide) abritée : hangar, usine désaffectée, lieu public pour que le spectacle soit itinérant toute l'année. Prévoir éclairage sur les robots et hors des robots. Son diffusé par H.P. parmi les robots et/ou autour du public. / La musique sera sur bande multipiste avec en plus trois tables UPIC sur lesquelles les robots improviseront de la musique. Eclairage, mouvement des robots, musique et sa diffusion entièrement automatisés. / Eventuellement un percussionniste sera adjoint." (Xenakis' notes in OM 32-5, p. 6).

**a)** **b)**

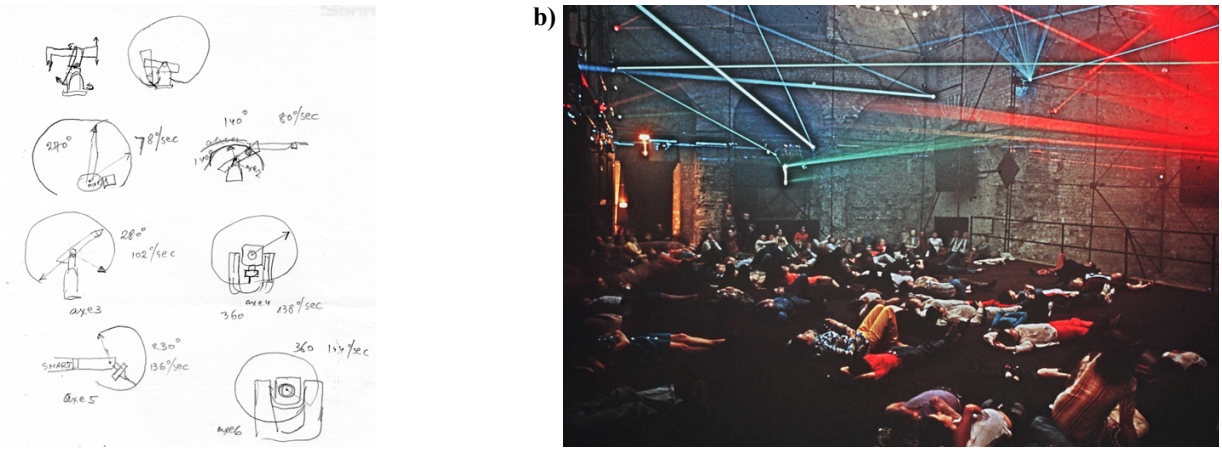

***Figure 4.25***. **a)** Initial studies for the use of light at the tip of an industrial robotic arm. Source: © Famille I Xenakis DR (OM 32-3, p. 9). **b)** Image of the visual effects achieved with the *Polytope de Cluny* (1972). Source: © Famille I Xenakis DR.

The drawings above show that Xenakis continually compared the size of the industrial robotic arm with the human scale (Figs. 4.23 and 4.24). However, this comparison may be why Harley (2014, p. 122) stated that "Xenakis' drawings propose humanoid robots with limbs (arms, legs, head), with precise fields of movement that he would control by computer programs."[60] But the project did not propose nor consider "humanoid robots with limbs" as part of the spectacle; rather, the composer merely showed a human scale comparison that could also indicate that real dancers would interact with the machines. This is evident when the model of industrial robotic arm (Fig. 4.26), of which was mentioned in all three projects and found in a flyer that indicates Xenakis' preferences, was confirmed.

**a)** **b)** **c)**

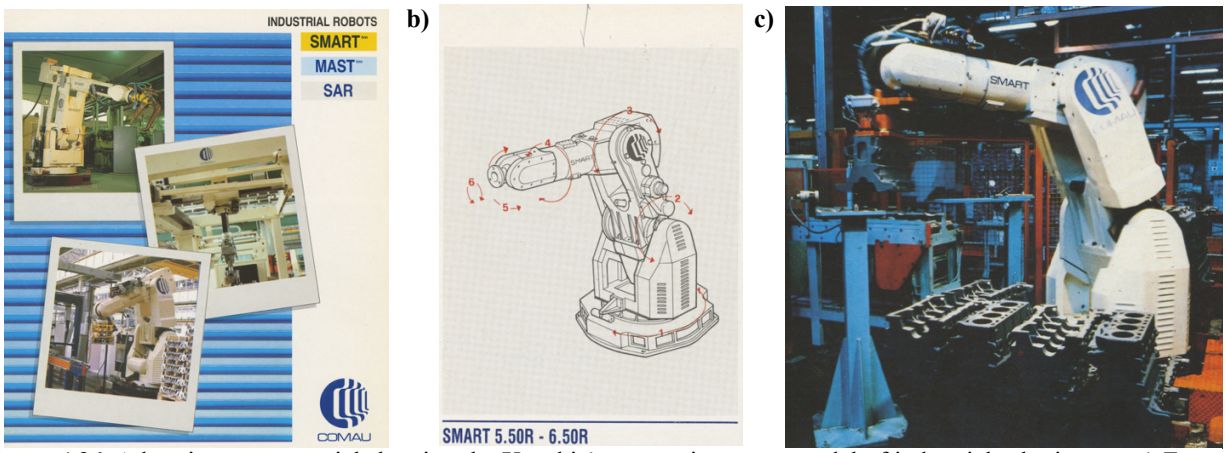


***Figure 4.26***. Advertisement material showing the Xenakis' expectations on a model of industrial robotic arm. **a)** Front page of the flyer. **b)** Model Smart 6.50R with the handwritten note that Xenakis was interested. **c)** Image of the practical application of the robotic arm in the flyer. Source of all: © Famille I Xenakis DR (OM 32-7, pp. 1 and 2).

[60] "Les croquis de Xenakis proposent des robots humanoïdes avec des membres (bras, jambes, tête), avec des champs précis de mouvement qu'il pourrait contrôler par programmes informatiques." (Harley, 2014, p. 122).

These results may be a complex spectacle based on new technologies that demanded not only greater financial resources but also a well-established engineering system that could automate most of, if not all, the spectacle. As the composer explains:

> The movements of the robots will form a kind of abstract ballet with sometimes realistic meanings to fix the ideas of the spectators and give them the irresistible desire to see and hear the rest. [...]
> So, singular fights, duels, melees and interspersed with calm periods of submission, politeness and love between them.
> So, a human society in miniature with, at the end, a hymn to the glory of humanity, justice, peace and war, motors of its creativity given by nature.
> The music and the lights on the robots and/or around them will underline the moments.
> On the other hand, the essential texts supporting the above-mentioned subject, taken from atomic and astrophysical sciences, philosophy, religions, human rights, animals, living beings, races, etc... will be projected by a system of devices on well visible screens[61] (Xenakis' project, OM 32-5, p. 4).

With this mechanical ballet, he could have overcome what he considered to be the organic limits of the human body in a choreography and the figurative and aesthetic impositions of dance. As he stated in an interview in 1989:

> Ballet is based on the human body, which has limited formal possibilities, in that it's confined to the movements we can make with our limbs, our trunk and our head, and that's all, although the distance from the earth can also play a role. The vocabulary of ballet, then, is not rich. Until Merce Cunningham appeared on the scene it always expressed emotions and relationships. The question is, how to substitute abstract events for these? How to design a choreography which expresses only shapes and the relationship between them in space and time? That's what I mean by abstract ballet. (Varga, 1996, p. 103).

With *Le ballet de robots émancipés*, Xenakis could completely realize his ideal product, through a completely automatized engineering system with a control from beginning to. As Fleuret (1988, p. 172) agrees:

> Without any doubt, by concessions at the period, [Xenakis] allows to provide a pretext for choreographic inventions, but always with the hope of a top-level correspondence, which then allows to overcome the diversity of details. In fact, he keeps his distance carefully and does not want to enter into a game that he cannot control from the beginning, even if he happens to accept, exceptionally, that the interweaving of many different inventions, i.e. antinomic, can open up on fertile results.[62]

[61] "Les évolutions des robots formeront une sorte de ballet abstrait avec des significations parfois réalistes pour fixer les idées des spectateurs et leur donner l'envie irresistible de voir et d'entendre la suite. [...] / Donc, combats singuliers, duels, mêlées entrecoupés de périodes calmes, de soumission, de politesse et d'amour entre eux. / Donc une société humaine en miniature avec pour finir un hymne à la gloire de l'homme, de la justice, de la paix et de la guerre, moteurs de sa créativité donnée par la nature. / La musique et les lumières sur les robots et/ou autour d'eux souligneront les moments. / D'ature part, les textes essentiels soutenant le sujet susmentionné, tirés des sciences physiques atomique et astrophysique, de la philosophie, des religions, des droits de l'homme, des animaux, des êtres vivants, des races, etc... seront projetés par un système de dispositives sur des écrans bien visibles" (Xenakis, OM 32-5, p. 4).

[62] "Senza alcun dubbio, per concessioni all'epoca, consente di fornire pretesto a invenzioni coreografiche, ma sempre con la speranza di una corrispondenza di vertice, che permetta allora di superare le diversità dei dettagli. Mantiene di fatto accuratamente le sue distanze e non vuole entrare in un gioco che non può controllare fin dall'inizio, anche se gli capita di accettare, eccezionalmente, che l'intrecciarsi di molteplici invenzioni differenziate, cioè antinomiche, possa aprirsi su fertili risultati." (Fleuret, 1988, p. 172).

The achievement of this project could not only turn a new page in Xenakis' production but also a completely new chapter on the artistic use of new technology. The development of many Xenakian aesthetic approaches and compositional tools in tandem with robotics would be an important step in his personal approach between science and art. The music composed specifically for this purpose would also represent an innovation in his production including his third piece with a Sixxen.

### 4.4.2 About Sixxens and robots

In this new work, Xenakis did not write a single note in a staff nor did he treat sound elements as a musical part. However, some ideas were described including intentions on acoustic and electronic treatments that would be realized but waiting for the financial investments necessary to develop and put those interests into practice. The first mention of the music can be found in the notepad OM 32-1 around February 1988, showing a clear situation in which UPICs interact with percussion instruments (Fig. 4.27).

**a)** **b)**

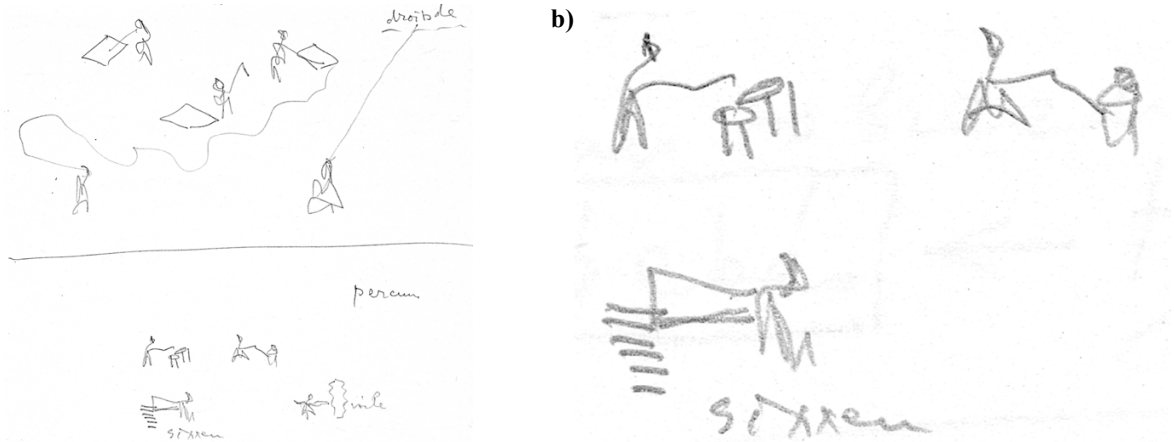


***Figure 4.27***. Aspects of the musical part of *Ballet de robots émancipés* in sketches from February 1988. **a)** Part of the sketch showing potential interaction between music created by UPIC and for percussion. **b)** Detail of the percussion instruments showing drums and one sixxen. Source: © Famille I Xenakis DR (OM 32-1, p. 6).

The acoustic instruments represent a percussion group playing drums and a sixxen. Xenakis desired to be clear with his own instrument and noted the name (Fig. 4.27b). On the other hand, it is unclear if he would compose new material for percussion or if he would use *Pléïades* in this new spectacle (as had occurred with *Taurhiphanie* and would occur with *Mexico Polytope* and *Athens Polytope*). This potential use of acoustic instruments shifted over time and it is certain that Xenakis was conflicted between composing only an acousmatic piece or using acoustic instruments with the electroacoustic part. As he briefly described:

> The music will be presented on a multitrack tape with three UPIC tables on which the robots will improvise music.
> Lighting, movement of the robots, music and its diffusion will be fully automated.

> Eventually a percussionist will be added.[63] (Xenakis' project, OM 32-5, p. 6).

It appears that, as briefly described in all the three projects found (OM 32-2, 32-5 and 32-6), a tape produced at the CEMAMU by Xenakis[64] would be diffused while new sounds would be added by manipulating the UPICs. Deferred time and real time electroacoustic music would be cohabiting this sound space. With the inclusion of the instruments this would ultimately be a mixed electroacoustic work for percussion, tape and live electronics, and the first of this kind with Sixxen. Another aspect that continues to be unclear is if the material composed for percussion would be for a soloist or an ensemble. Even with few musical elements to closely analyze, it is certain that a new Xenakian approach on the use of SIX-XEN would be developed with the *Ballet de robots émancipés*. With this work, Xenakis would maybe write for a Sixxen to interact with electronics in both deferred and real time, or he would maybe compose a solo set-up including one sixxen or a piece for percussion group and electronics, of which he had not done previously and would be significant for his instrument. The resulting possibilities were limitless but unfortunately this approach would not be developed, leaving this idea to be fulfilled by future composers working with his instrument. Xenakis was aware that his instrument would remain a considerable option in the percussion sets of possibilities. Writing to Philippe Manoury on June, 1993, he expressed:

> the sound richness of these new instruments would be susceptible of interest to many composers. If a set were to be available in the percussion pool, this would promote a wider dissemination of the existing repertoire and would also allow the creation of new works.[65] (Iannis Xenakis, mail to Philippe Manoury, June 25, 1993).

As it will be shown in Chapter 11, the richness of his instrument attracted many composers who were inspired to expand the concept. These would even develop several of the electronic interactions that Xenakis envisioned for the *Ballet de robots émancipés*. However, the genius of the interaction with industrial robotic arms in a choreographic spectacle remained only at the level of the composer's ideas and desires, closing the last intent that Xenakis had to work using his own acoustic instrument.

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[63] "La musique sera sur bande multipiste avec en plus trois tables UPIC sur lesquelles les robots improviseront de la musique. / Eclairage, mouvement des robots, musique et sa diffusion entièrement automatisés. / Eventuellement un percussioniste sera adjoint." (Xenakis, OM 32-5, p. 6).

[64] As the composer stated the electroacoustic development would necessarily be made at the CEMAMU. In the original: "La musique sera faite entièrement par moi, en principe au CEMAMU." (Xenakis' project, OM 32-5, p. 3).

[65] "[...] la richesse sonore de ces nouveaux instruments serait susceptible d'intéresser bon nombre de compositeurs. Dans le cas où un jeu serait disponible au pool de Percussions, serait favorisée une plus large divulgation du répertoire déjà existant et cela permettrait également la création d'œuvres nouvelles." (Iannis Xenakis, mail to Philippe Manoury, June 25, 1993).

# Part II – On sounds, structures and correlations

# Chapter 5. Preliminary to an analysis: Orbiting *Pléïades*

*Musicologists may analyse scores and come up with their conclusions–and they may be perfectly right–*
*but their findings need not indicate anything conscious on my part.*
Iannis Xenakis (Varga, 1996, p. 204)

All aspects initially addressed in the Chapter 1 indicate a background based on traditions from Indonesia that stimulated important changes and created new perspectives for Iannis Xenakis' production, including *Pléïades*. The period in which the composer worked on the piece is significant for his creative approaches. As Matossian (1981, p. 279) expressed, "The decade 1970-1980 will be prestigious and fruitful for Xenakis. [...] This achievement is particularly striking because it is opposed to the general trend of crisis and uncertainty in music, which is established during the second half of this decade."[1] Solomos (1996, p. 63) affirmed that "The 1970s celebrate the apotheosis of Xenakis' renown, of which it is impossible, within the framework of a concise book, to retrace even the most important stages."[2] For both authors, two main aspects reinforce the importance of the decade for the composer: the first trip to Greece in November 1974 after the end of the military dictatorship (which lasted 1967-1974), and the *Cycle Iannis Xenakis* Festival in December 1977, a month-long festival specifically dedicated to the composer' music and organized by the French Ministry of Culture and Communication.

As Solomos (1996) affirmed, Xenakis reduced his theoretical work[3] and instead doubled his compositional production and development of new compositional tools based on Brownian motion, arborescence and sound halos (*halos sonores* in French as coined by Solomos himself). Even if different factors also seem important for both authors (such as an impressive volume of commissions and new creations, an increase in the number of lectures and invitations to travel all over the world and prizes received), the return to visit the Greece in 1974 and the specific Cycle in his 1977 homage are the two main factors that vividly stimulated Xenakis. However, in terms of contributions for fundamental changes in his compositional approaches, another factor would be far more momentous: the 1972-1973 trip to Indonesia. Here, it will be addressed how these connections and correlations were determinant for a significative part of his production until the middle of the 1980s. In this way, the analysis of *Pléïades* could depict fundamental procedures that are consequent of Xenakis'

[1] "La décennie 1970-80 sera prestigieuse et féconde pour Xenakis. [...] Exploit particulièrement saisissant du fait qu'il s'oppose à la tendance générale de crise et d'incertitude en musique, qui s'instaure au cours de la seconde moitié de cette décennie." (Matossian, 1981, p. 279).
[2] "Les années 1970 célèbrent l'apothéose de de la renommée de Xenakis, dont il est impossible, dans le cadre d'un ouvrage concis, de retracer même les étapes les plus importantes." (Solomos, 1996, p. 63).
[3] It is however important to mention that he published *Musique. Architecture* in 1971 and an augmented version in 1976, he defended his thesis in 1976 and published the exchanges of the defense in 1979 with the title *Arts/Sciences. Alliages*.

connections with Indonesian performative arts. To this end, his other pieces will also be shortly mentioned, producing a larger comparison and allowing for a broader understanding on a specific part of his production.

The context of the composition and the specific issues that surrounded the production of *Pléïades*, like the exchanges with the commissioners and musicians, were discussed in Chapter 2, and the different steps and documents produced to achieve the final piece were discussed in the Chapter 3. As a continuation of the vast context previously exposed, the analysis of *Pléïades* will be from now specifically addressed and its presentation will be essentially made in three chapters. Chapters 5 introduces tools and methods used by Xenakis, Chapter 6 is a formal analysis of the four movements, and Chapter 7 correlates his work with Indonesian music. The discussion in these chapters will shed light on the structural elements, the creative process and the conceptual approaches that determined the final results, while having the SIX-XEN as a central part of the discussion. Thus, the understanding of «*Métaux*» and its typical sonorities will also elucidate the materials present in the other movements, as well as highlight strong correlations with the intrinsic characteristic of Indonesian performative arts.

Even though the piece represents a fruitful moment in Xenakis' production, being his second largest work after *Kraanerg* (1968-1969), there is no complete analysis of *Pléïades*, but rather only different analytical approaches tied to the three monotimbral movements. Lacroix (2001) focused specifically on «*Claviers*» by considering the aspects of the pitch relations and some rhythmical structures of determined textures in the movement; this analysis was the only source to factor elements from Indonesian traditions as sources of materials for this piece. Exarchos (2007) focused on the Sieve Theory and the mathematical aspects of the creation of pitch collections in different pieces by the composer. He noted *Pléïades* frequently and addressed more specifically the sieve that is in the core of «*Claviers*». Marandola (2012) provided an interpretative analysis of «*Peaux*». Bogler (2017) worked on a section classification of «*Métaux*» and presented an interview with the constructor of a specific Sixxen in Switzerland, while Ceuster (2021) produced a comparative timbral analysis of some Sixxens constructed and the sonic consequences in «*Métaux*». Barthel-Calvet (2000) presented a broader discussion about the rhythmic treatments produced by Xenakis, including many of his pieces. She included *Pléïades* addressing specifically «*Claviers*», «*Peaux*», «*Métaux*», and rarely «*Mélanges*». She discussed in-depth Xenakis' rhythmic treatments and briefly mentioned «*Mélanges*», but more remains to be discussed about this movement. Even if these aforementioned contributions are significant, it lacks integral and comparative discussion about all movements of *Pléïades*. As Ceuster (2021, p. 72) pointed out:

> These variations between performances of *Pléïades*, due to the variations in the instruments

> [in «*Métaux*»] used by the ensembles, pose major challenges to the music analyst. As both pitch and timbre are largely variable musical elements in this movement, the only constant component suitable for score analysis is its rhythm. And yet, a purely rhythmic analysis would do little justice to the listener's experience. This would negate the emergent microtonal clusters, the penetrating dissonances, the ever-so pungent metallic sounds heard in so many performances of *Métaux*. Certainly, these elements, too, constitute an important part of the work as a whole.
> Perhaps this is why *Métaux* and *Mélanges* have received relatively little analytical attention. While the two other parts of *Pléïades* (*Peaux*, written for skinned drums, and *Claviers*, written for idiophones) have been the subject of compelling structural analyses

In relation to the analysis of the different movements, Lacroix (2001, p. 80) corroborates that: "Let us recall, moreover, that these sections, in which are developed important researches on the not very quantifiable parameter of the timbre, with the help of systems of sounds with indeterminate pitches, lend themselves more hardly than «*Claviers*» to a methodical analysis."[4] However, a more integrative analysis on *Pléïades* is crucial in that it may present new perspectives on researches about the composer and his approaches; in fact, the composer himself pointed to such a need for a comprehensive look. When introducing the piece, Xenakis stated that:

> *Pléïades*, "pluralities", "several", because six percussionists, four sequences. The rhythm is essential, that is to say the temporal order of events, the combination of durations, intensities, timbres. [...]
> The only source of this polyrhythm is the idea of periodicity, repetition, duplication, recurrence, copy, faithful, pseudo-faithful, without faithfulness. [...]
> An axiomatization accompanied by a formalization represented by the theory of sieves, identifies a part of such transformation problems in all domains, spaces or ordered sets.
> In *Pléïades*, this fundamental idea of the temporal duplication (recurrence) of an event or a being in which our physical but also human universe is immersed, is also taken up in another "dimension" of music, that of the pitches. In this dimension European (Western) music has not moved since Greek antiquity. The system, the diatonic scale still reigns, even and especially in music (like serial music) where the chromatic total is the basis in which the choice of notes is immersed. Besides, its extension to a scale (tone series) where the unit would be the comma would not change the "climate", the field of forces of the melodic lines or the clouds of the pitches.
> This is why I have made a double attempt here. The first one, already in *Jonchaies* for orchestra, was to build a scale outside the West that was strong enough and characterized enough, but that could be played on diatonic keyboards such as marimba, xylophone, vibraphone. The second was to build a new metallic instrument called SIX-XEN [...][5]

[4] "Rappelons par ailleurs que ces sections, dans lesquelles sont développées d'importantes recherches sur le paramètre peu quantifiable du *timbre*, à l'aide de systèmes de sons à hauteurs indéterminées, se prêtent plus difficilement que «*Claviers*» à une analyse méthodique." (Lacroix, 2001, p. 80).

[5] "*Pléïades*, « pluralités », « plusieurs », car six percussionnistes, quatre séquences. Le rythme y est primordial, c'est-à-dire l'ordonnance temporelle des événements, la combinatoire des durées, des intensités, des timbres. [...] / L'unique source de cette polyrythmie est l'idée de périodicité, répétition, duplication, récurrence, copie, fidèle, pseudofidèle, sans fidélité. [...] / Une axiomatisation accompagnée d'une formalisation représentée par la théorie des cribles, cerne une partie de tels problèmes de transformations dans tous domaines, espaces ou ensembles ordonnés. /Dans *Pléïades*, cette idée fondamentale de la duplication (récurrence) temporelle d'un évènement ou d'un étant dans laquelle est immergée notre univers physique mais humain aussi, est également reprise dans une autre « dimension » de la musique, celle des hauteurs. Dans cette dimension la musique européenne (occidentale) n'a pas bougé depuis l'antiquité grecque. Le système, l'échelle diatonique y règne toujours, même et surtout dans les musiques (comme la musique sérielle) où le total chromatique est la base dans laquelle est plongé le choix des notes. D'ailleurs son extension à une échelle (gamme) où l'unité serait le comma ne changerait pas le « climat », le champs des forces des lignes mélodiques ou des nuages des hauteurs. / C'est pourquoi ici j'ai fait une double tentative. La première, déjà dans *Jonchaies* pour orchestre, étant de bâtir franchement une échelle hors occident suffisamment forte et caractérisée, mais pouvant être jouée sur des instruments à claviers

(Xenakis, 1979, p. i).

The composer presents the main aspects that, when studied, could provide leads for a deeper insight. His holistic view about his own production had not yet been previously considered with *Pléïades*, and may bring multidimensional perspectives in relation to the four movements. «*Mélanges*» is a kaleidoscope of continuous transformation between the monotimbral movements that gathered all the elements that Xenakis mentioned above, but was not the subject of any specific approach. This specific movement could bring new perspectives on Xenakis' treatment of timbres specially and the creative process of *Pléïades* in general. The connections and correlations of structures and the integration of tools and approaches can manifestly enlighten the understanding of the characteristics and fundamental understanding of SIX-XEN. *Pléïades* may even highlight most of Xenakis' production from the mid-1970s to mid-1980s.

The present analytical procedures will emphasize different elements. Besides the formal structures resulting from the compositional approach, this discussion will note correlations with Indonesian performative arts. The central role attributed to the SIX-XEN, even regarding movements in which SIX-XEN is not required, opens fundamental viewpoints about the Xenakian invention and its construction. This instrument and the interest in sonorities akin to those from Indonesia may explain why Xenakis favored and emphasized the use of vibraphones in «*Claviers*». For this reason, analyzing the metallic instruments and comparing their different roles in the development of materials proved significant. However, initial sections will be presented prior to specific procedures and results; in particular, this will highlight the *modus operandi* used by the composer, as well as standard techniques he was generally using at the time of composition and the specific terminology chosen to describe structures during the analysis.

## 5.1 Composition process

The initial sketch OM 28-17 p. 15 (archived at the *Collection Famille Iannis Xenakis*) mentions originally that five movements could have been composed: "α) solistes β) métaux γ) peaux δ) claviers ε) tutti". The movement for soloists was completely eliminated in a determined moment, not presenting any initial studies or drafts, and "tutti" was called «*Mélanges*» at the end. The order in this sketch also differs than what would be presented as the final version. This sketch has an indication from September 28, 1978, and the first complete score produced as a manuscript was finished on December 27 of the same year (see more details in Chapter 3–Section 3.1.1), showing that Xenakis

diatoniques tels le marimbaphone, xylophone, vibraphone. La deuxième étant de faire construire un instrument métallique nouveau baptisé SIX-XEN [...]" (Xenakis, 1979, p. i).

had worked on it for three months. *Pléïades* is thus characterized in the final sheet music by four movements: «*Claviers*», «*Peaux*»[6], «*Métaux*», and «*Mélanges*» (as the order presented by the composer in the original complete scores–Xenakis, 1979 and Xenakis, 2013). The piece required three categories of specific instrumental timbres: percussion keyboards (in «*Claviers*»), drums (in «*Peaux*») and the SIX-XEN (in «*Métaux*»). Then «*Mélanges*» (from the French term meaning mixtures) was written to gather the aforementioned instrumental categories in a recapitulative assemblage of previous excerpts.

It is important to consider how Xenakis developed the musical ideas for this project and how he utilized the creative process that he continued to use in his production of the late 1970s. For *Pléïades*, he assembled ideas and references, and meticulously a series of drawings with vertical and horizontal aspects on millimeter paper, with almost every note, phrase, passage or texture present. He then calculated the size of the final score and how much time would be needed to transcribe to traditional notation; the final first manuscript score would be completed on December 27, 1978. These different stages of his creative process will thus be referred to as: milestone 1 (initial studies and drafts), milestone 2 (sketches and drawing schemes of the piece), milestone 3 (preparation to transcribe the previous stage) and milestone 4 (final transcription). The basis of the present analytical proceedings is the material archived in the *Collection Famille Iannis Xenakis*, with some documents specifically kept in the *Bibliothèque La Grange-Fleuret* (BLGF).

It is fundamental to understand milestone 2 because it is likely that most characteristics of the final product are produced during this intensive stage of the creative process. The sketches then produced in this milestone 2 are nearly the finalized material presented in the score but in a mix of dotted notation and graphic notation (Fig. 5.1). The composer then established the main structural foundation and other fundamental aspects.

[6] The only movement that actually presents a date of the beginning of its composition (October 11, 1978).

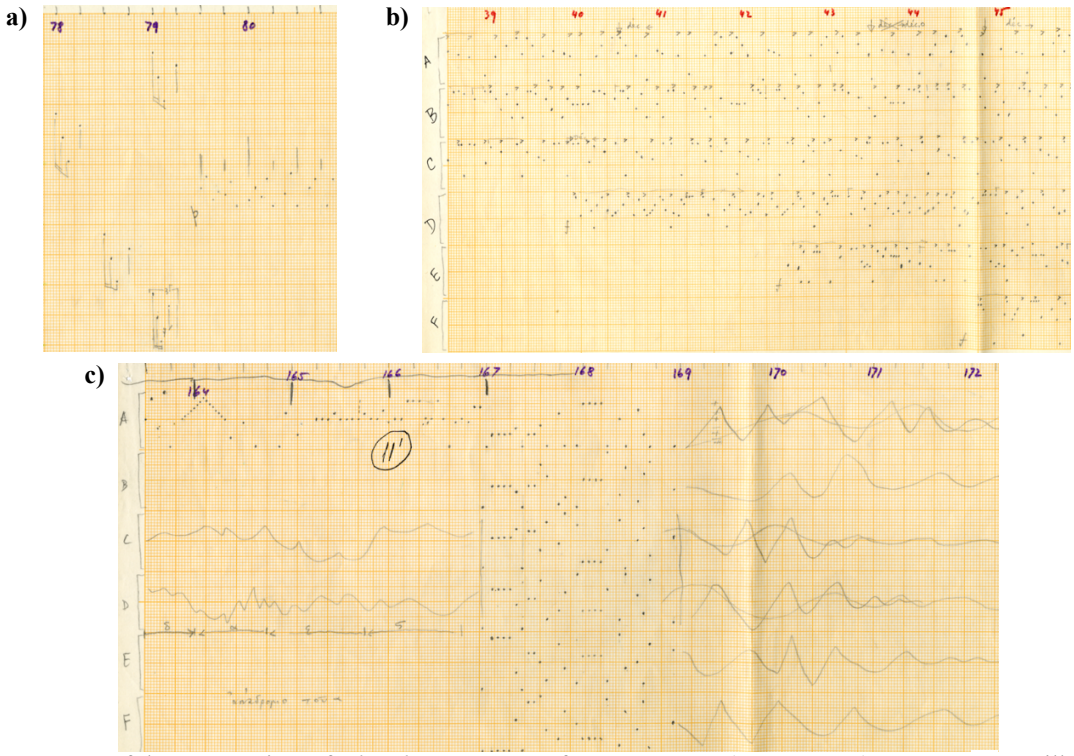



***Figure 5.1***. Part of the manuscripts of *Pléïades*. **a)** Excerpt from «*Métaux*» (meas. 78-80). Source: © Famille I Xenakis DR (OM 28-17, p. 5). **b)** Excerpt from «*Peaux*» (meas. 38-45). Source: © Famille I Xenakis DR (OM 28-17, p. 18). **c)** Excerpt from «*Métaux*» (meas. 163-172). Source: © Famille I Xenakis DR (OM 28-17, p. 8).

It is perceptible thus that Xenakis prioritized the distribution of events in time as consequence of a visual correlation and/or a mathematical proportion rather than in a disposition strictly tied to a time signature, which is why some sections and subsections do not fit exactly in a 4/4 measure. The metric aspects were always fundamental for him (and the millimeter indications greatly contributed to an accurate precision), but the bars of a measure were not an imposition to limit certain elements and their developments during the initial phases of composition with millimeter paper. A measure was therefore simply a space to transpose the musical materials that had originated from drawings and mathematical formulas. The time signature itself was not the primary focus to produce music, nor was it what guided the temporal disposition of materials, being almost the last element to appear when the piece was fully completed as *Pléïades* was integrally transposed in 4/4. The time signature was consequential in his compositional approach. As a result, the composer regularly chose millimeter paper for his production, besides the fact that it was completely usual to an architect and engineer as experienced as he was.

The pitches, rhythms, sections and textures are present in the milestone 2, but the dynamics are not yet indicated; in fact, they appear to have been generally added when he started transcribing this material to a staff–milestone 4–and posteriorly when doing corrections to new editions of the final

score[7]. In certain sections, he allowed himself freedom to compose further at the transcription (milestone 4), producing the final decisions directly on the staff. For instance, this occurred in «*Métaux*» in meas. 76 to 78 where he left all the voices to be filled in later and only noted the type of texture that should occur. He repeated this idea at the end of meas. 100, when he notated a question mark on the millimeter paper (Fig. 5.2a), adopting later a dactyl motive in unison for the six voices only in the definitive transcription. He likewise left all voices to be written in the final transcription of the excerpt comprising meas. 121 to 126. With a very similar texture, he repeats this in meas. 135 to 138, as indicated in the Fig. 5.2b (this material turns out to be partially the introductory and conclusive material the composer used in «*Mélanges*»).

**a)** **b)**

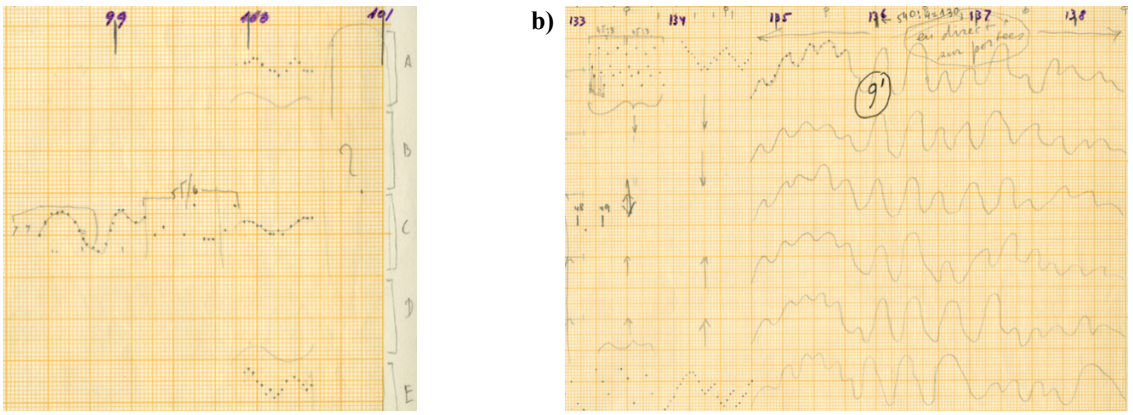


***Figure 5.2***. Part of the manuscripts of *Pléïades* showing incomplete passages. **a)** Excerpt from «*Métaux*» (meas. 98-100). Source: © Famille I Xenakis DR (OM 28-17, p. 5). **b)** Excerpt from «*Métaux*» (meas.133-138). Source: © Famille I Xenakis DR (OM 28-17, p. 7).

On the other hand, other passages show that Xenakis had abandoned some initial ideas throughout the transcription as from meas. 146 to the end of «*Peaux*» and 129 to the end of «*Métaux*» (which will be further addressed below). Thus, the sections that are not completely composed on milestone 2 are rare. It was at this moment that he devoted his energy of elaboration and artistic intention on the musical structures and compositional materials. It could be thus considered the center of the creative process, also demonstrating the fundamental importance of visual objects in determining sound elements in his approach. By associating the structures, characteristics and development of the materials with lines and curves, he established his work to correlate with visual attributes.

[7] «*Peaux*» has many indications of dynamics that are precisely respected in the final transcription (almost all of them are already present at this stage), however for the other movements this occurs less. Some rare dynamics can be seen in «*Métaux*» (as in meas. 79, 92 to 101, 121 to 126, 149 to 154, and 169 at the end) and their indications were almost all reproduced exactly the same in the final score. «*Claviers*» presents no dynamic indicated in the milestone 2. «*Mélanges*» shows also no indication of dynamics at this stage, and almost all dynamics have been changed from the original material of the previous movements.

As the composer adopted this two-dimensional way of working with his creation, much of the material inscription followed an objective plan of drawing shapes and visual structures[8]. Because of this, the undulatory aspect of the melodic contours is quite evident (as can be perceived in the Fig. 5.1c and Fig. 5.2 above) and, as will be shown below, is important to the development of the materials in «*Claviers*» and «*Métaux*». Another element that presents a clear visual reference in Xenakis' music is what he called the arborescence. These two main aspects, wave form as melodic contour and arborescence, along with other tools that Xenakis mainly used during the composition of *Pléïades* will be better addressed from now on.

## 5.2 Xenakis' basic compositional tools

To understand the specificities of each movement of *Pléïades*, it is important to summarily elucidate terms and concepts that appear throughout the work. As will be shown, these different elements do not appear only independently or in successive sequencies; they can be mixed and superposed, occurring also in parallel. As Xenakis explained, "Methods and theoretical approaches may be distinct depending on the plan being addressed, or they may be used on more than one layer at a time."[9] (Xenakis, 1994, p. 21). It is in this context that *wave form*, *arborescence*, *cloud of sounds*, *sound halo*, *sieve theory*, and *metricity* versus *arrhythmicity* will be briefly defined and initially described.

### 5.2.1 The undulatory aspect of the melodic contours

Waveforms are characteristically formed by oscillations between crests and troughs (Fig. 5.3a), with the horizontal distance of two crests referred to as a wavelength (if measured in distance) or period (if measured in time). A low frequency is characterized then by a long wavelength and a high frequency by a shorter wavelength (Fig. 5.3b). The height is the vertical distance between a crest and a trough, and the amplitude is the distance from the center of wave to the top of a crest or to the bottom of a trough.

[8] It is necessary to consider that drawing and composition have always been part of Xenakis' approach, and that at this point in his career he had already launched the UPIC (in French *Unité Polyagogique Informatique du CEMAMu*). This device represents the first drawing interface between computer-aided sound design and production, and marks the culmination of the composer's research approach to sound treatment, electroacoustic music, and the musical architecture of designed structures. It also represents the culmination of an entire institution he created in 1972, the CEMAMu (*Centre d'Etudes de Mathématique et Automatique Musicales*) and the work of numerous researchers attached to it. He had even already composed with the UPIC (*Mycènes Alpha*, 1978) before starting the work with *Pléïades*, so at this moment the correlation between design and sound result seemed to him, more than evident, essential.

[9] "Les méthodes et les approches théoriques peuvent être distinctes selon le plan abordé, ou bien elles peuvent être utilisées sur plus d'un plan à la fois." (Xenakis, 1994, p. 21).

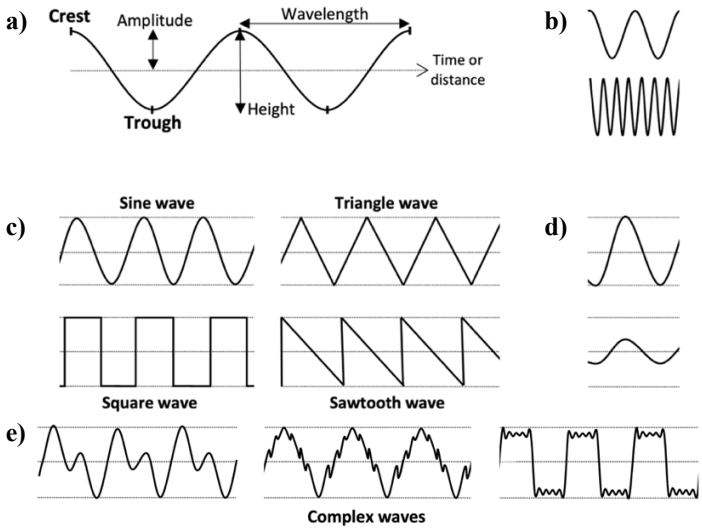



***Figure 5.3***. Characteristics and types of waveforms. **a)** Terms indicating vertical and horizontal characteristics. **b)** Comparison between a low frequency (upper wave) and a high frequency (bottom wave). **c)** Main types of simple waveforms. **d)** Comparison between a louder (upper wave) and a softer sound (bottom wave). **e)** Representation of complex waves.

The characteristic aspects combined can produce different types of waveforms and shapes (Fig. 5.3c), as well as different dynamics (Fig. 5.3d), being the complex waves a combination of different types of shapes (Fig. 5.3e). Xenakis consciously used these products in his piece as profiles of melodic structures, eminently in «*Claviers*» but also in «*Métaux*», appearing thus by recapitulation in «*Mélanges*». Thus, sinusoidal, sawtooth and triangle waves could describe by analogy some melodic profiles used in *Pléïades* (Fig. 5.4).

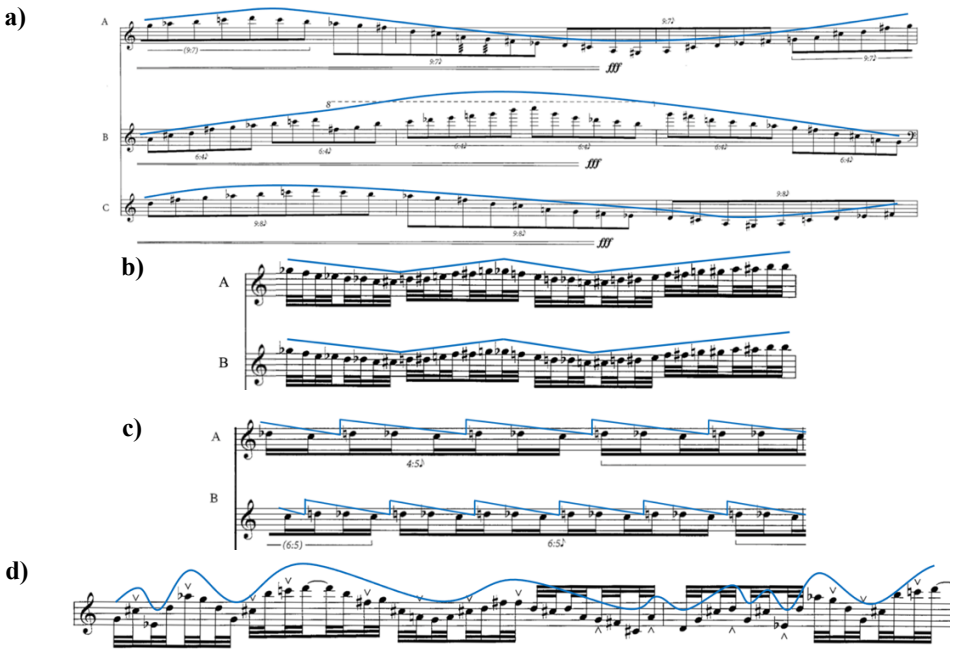



***Figure 5.4***. Melodic profiles characterized by waveforms in «*Claviers*» and «*Métaux*». **a)** Source: *Pléïades*, «*Claviers*», meas. 68-70 (Xenakis, 2013) – © Éd. Salabert. **b)** Source: *Pléïades*, «*Métaux*», meas. 84 (Xenakis, 2013) – © Éd. Salabert. **c)** Source: *Pléïades*, «*Métaux*», meas. 26 (Xenakis, 2013) – © Éd. Salabert. **d)** Source: *Pléïades*, «*Claviers*», meas. 44-45, player A (Xenakis, 2013) – © Éd. Salabert.

Concepts, experiments developed and practical applications are not independent of these aspects as he stated during an interview with Lohner (1986, p. 52):

> This is very important aesthetically [...] on the one hand, different drawings of waves sometimes produce the same effect. This is well known. The ear doesn't always hear the differences between graphisms (the contour of the waveforms); it only distinguishes different classes of waveforms. It would be interesting to examine this. As for the variation of a waveform or a dynamic envelope, you'd need to have special transformation functions, maybe algebraic or other types with special keys on the drawing tablet itself. This could happen by varying the same function, or it could vary stochastically. For example, presently we can do this by following the same curve that you draw to describe different envelopes. So graphically we have certain ways of achieving variation.

One must also note that Xenakis used numerous frequencies to develop his melodic waveforms, which signifies that even a melody developed as a sinusoidal waveform is in fact an aggregate of numerous frequencies (that has also numbers of intrinsic frequencies naturally present in each pitch due to the harmonic series). Thus, a scale comparing macro and microstructures shows a fluid passage between melodic wave aspects, its different pitches and the individual constituents of each pitch as a continuous musical structure. Xenakis himself had intentionally considered this idea, as he stated:

> If we conceive the elements, whatever they are, as tiny procedures and therefore tiny rules, then we see that the notion of rule-procedure can be applied indefinitely in both directions, in the sense of the microcosmic and the macrocosmic, by hierarchical nesting, by pillars. Example: the sounds which possess a pitch are elements subjected to a rule-procedure which forms a melody. But the pitch of the sound in its turn can be considered as the result of a rule-procedure of the repetition of a waveform at a frequency corresponding to the pitch. The waveform itself, which is only a line, can be generated by a stochastic or other rule. We already have three levels of nested rules. The melody level, the sound level, the waveform level. We could have continued in this way in both directions, towards the smallest as well as towards the largest.[10] (Xenakis, 1994, p. 110).

This integral analogy between a melodic profile and a specific wave phenomenon is connected to Xenakis' approaches; however, because a certain ambiguity may result between characteristics of melodies and waveforms, some terms need to be clarified. For example, the vertical oscillation in which a melody is developed as a waveform is visually parallel to the amplitude of a characteristic waveform, but these aspects are not similar in terms of their intrinsic properties. While the vertical changes of a melody implicate differences in terms of frequencies and range, the vertical changes of a waveform implicate different dynamics. They are thus not characterized by the same parameters

[10] "Si nous concevons les éléments, quels qu'ils soient, comme des procédures minuscules donc des règles minuscules, alors nous voyons que la notion de règle-procédure peut s'appliquer indéfiniment dans les deux sens, dans le sens du microcosmique et dans celui du macrocosmique, par emboîtements hiérarchisés, par piliers. Exemple : les sons qui possèdent une hauteur sont des éléments soumis à une règle-procédure qui forme une mélodie. Mais la hauteur du son à son tour peut être considérée comme le résultat d'une règle-procédure de la répétition d'une forme d'onde à une fréquence correspondant à la hauteur. La forme d'onde elle même, qui n'est qu'une ligne, peut être engendrée par une règle stochastique ou autre. Nous avons déjà trois paliers de règles emboîtées. Le palier de la mélodie, celui du son, celui de la forme d'onde. On aurait pu continuer ainsi dans les deux sens, vers le plus petit comme vers le plus grand." (Xenakis, 1994, p. 110).

and do not have the same unities, such as the range being classified in terms of lowest and highest pitch, musical interval, or frequency determined in Hertz (Hz) and the amplitude in terms of decibels (dB). Another confusion that may arise is that part of a melody with waveform characteristics can present ascending movement, but result as only part of a stable wave, be it sinusoidal or triangular. Because of these distortions in terms of macro and microstructures, two vocabularies will be adopted that must be carefully observed by the reader: one for the characteristics of the waveform that structures the melody and another for the melodic, harmonic and rhythmic characteristics of the same material.

These structures and materials are not exclusive of *Pléïades*, as they were previously developed by the composer in pieces such as *Evryali* (1973)[11], and in posterior works such as *Mists* (1981), to which Schiffer (1981, p. 35) mentioned "gigantic wave-movement", or *À r. (Hommage à Ravel)* (1987), to which Squibbs (2003, p. 122) mentioned "sinuous melodic contour introduced into his instrumental music in the early 1970s". The melodies characterized by waveforms can be directly correlated to other structural treatments that Xenakis also developed in *Pléïades*: the arborescences and the clouds of sounds.

### 5.2.2 From arborescences to clouds

Xenakis never addressed the formal aspects of the arborescence in his theoretical publications, but he mentioned the term and its definitions in select interviews. As he stated in 1989:

> the idea of the tree shape is basic, both in nature and in logic, and potentially also in music. I've used it in music in the form of bushes, arborescences. Because instead of having melodic patterns and polyphony made up of single lines, you can have a full bush and transform it by rotations, zooms, alterations of all kinds. (Varga, 1996, p. 207).

Even if the composer personally published little about the topic, this is an important element present in his production, having appeared from the beginning of the 1970s. The composer thus used these "bushes" and "tree-like shapes" to design melodic structures and to dynamically produce variations in polyphonic textures[12]. When interviewed by Zaplitny (1975) and asked about compositions that he was particularly proud of or that were exploring new territories since his theoretical book *Musiques formelles* (Xenakis, 1963) and where the potential could lie also in the future, Xenakis answered:

> Essentially there are two directions. One lies in the instrumental music; by taking into consideration a kind of generalization of the melodic pattern of the melody and the manipulations that are possible, you create bushes or tree arborescences of melodic patterns.

[11] Piece dedicated to Marie-Françoise Bucquet who travelled with Xenakis to Indonesia in 1972-1973.
[12] As mentioned by Solomos (1996, p. 69), "At a very general level, the arborescences celebrate Xenakis' reunion with a certain polyphony." Original mention: "À un niveau très général, les arborescences célèbrent les retrouvailles de Xenakis avec une certaine polyphonie." (Solomos, 1996, p. 69).

> That is, you don't have one little pattern, but a complex of melodic patterns that are not melodies in the old sense, but which are in continuous change. Therefore what you have is a kind of bush of such melodic patterns which are intermingled. Now this bush or arborescence of melodic patterns can be considered as an object, and you can treat it by logic, outside-of-time or in-time, by expanding it or by moving or rotating it as an object in itself. This produces a new type of generalization because it can happen with serial music or tonal music, and, even more importantly, because the rotations are continuous, you don't have just one melodic line, but something which is much more complex.
> [... A shape in continuum is] a form which can be changed. In order to change it constantly, you have to define it first, because the change is in-time already. That is, you have to propose something, like a bush, and then you can modify it with all these transformations. You can also effect[uate] more complicated transformations by using the complex numbers, which I have done also. So this is one main direction and there are several representative works. (Zaplitny, 1975, p. 100).

As he mentioned in the above interview, the first work using arborescences was *Evryali* (1973) for piano, but he also referred to *Erikhthon* (1974) for piano and orchestra, *Noomena* (1974) for orchestra, *Gmeerooh* (1974) for organ. After this initial period, his works would feature arborescenes, including *Khoaï* (1976) for harpsichord, *Akanthos* (1977) for soprano and eight musicians, and as discussed here, *Pléïades* (1978). Gibson (2005, p. 2) mentioned that the concept of arborescence refers to the mathematical approaches developed with the graph theory, stating:

> When elements are tightly linked together, they form a particular object. This is the case with arborescences. The concept of arboresence 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.

In graph theory, a node (also called point or vertice) is the elemental unit representing something that can be connected to other nodes by edges (also called lines or links). In Xenakis' main ways to apply this theory, nodes are specific pitches, and the edges are the intervals that separate two nodes. The relation with polyphonic structures thus exists because, from a specific node (pitch), two or more independent voices can emerge and develop different patterns of expansion of its intervallic characteristics.

In Xenakis' personal notes it is seen that he studied correlations between his music and these "tree-like shapes", opening the possibility for a diversified design of polyphonic structures and a gradation that could allow from a subtle to a dense ramification of the branches (Fig. 5.5a). It is also perceptible the amount of time and energy that the composer dedicated to produce such kind of correlation between visual aspects and consequential sonorities, and the period of time that it was part of his compositional practices (essentially from the beginning of the 1970s until at least the middle of the 1990s). The arborescences were then providing a support on which the composer could produce dynamic variations of musical elements, primarily and generally on melodic structures, but with consequences on timbre development, textural characterization, and instrumental choices. He mainly

used arborescences to expand the relatively independent melodic lines that were visually correlated to representations of numerous branches of a common trunk (Fig. 5.5b and c). It also indirectly toadied in organizing the timbral and the textural development when varying the range and the density gradation of these materials, as well as the possibilities that specific instruments could bring to the piece.

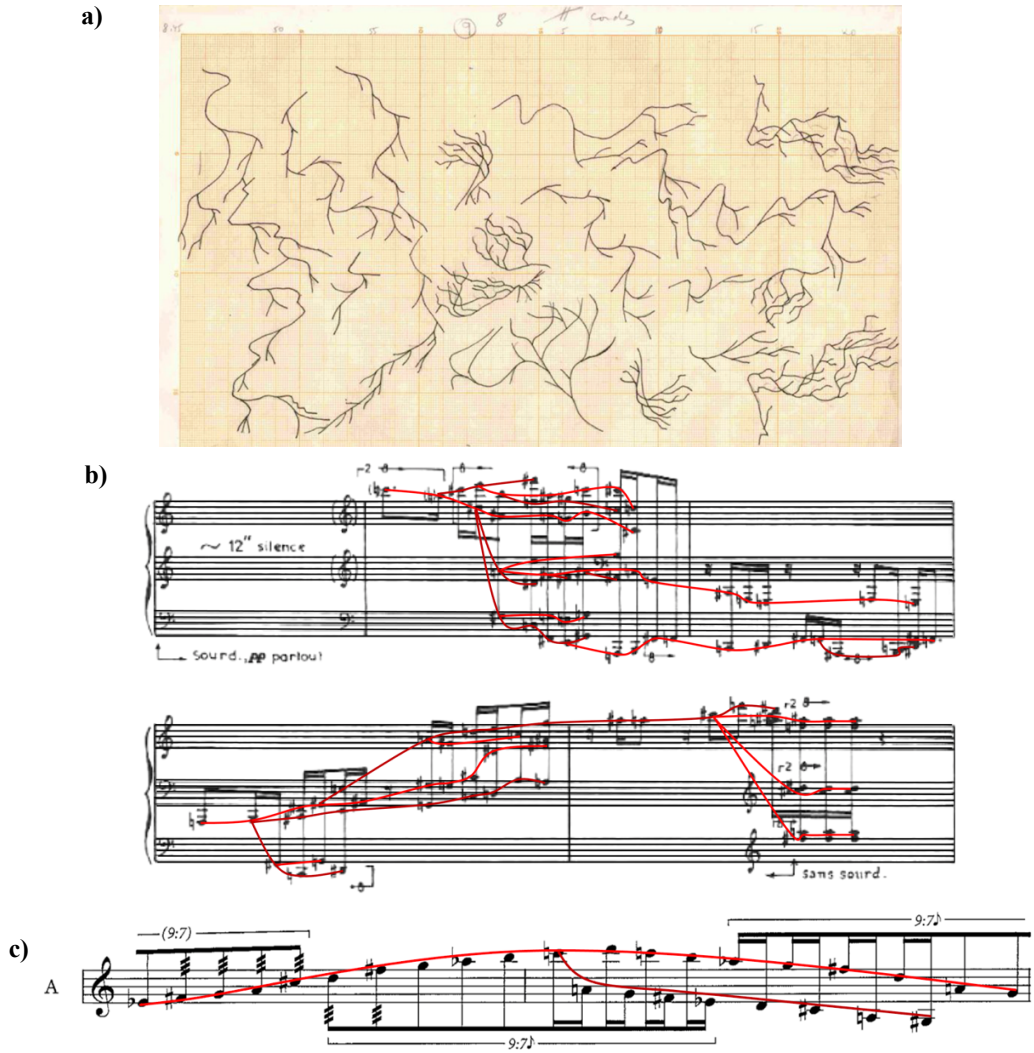



***Figure 5.5***. Arborescenses in Xenakis' works. **a)** Studies to produce *Erikhthon* (1974). Source: © Famille I Xenakis DR (OM 27-6, p. 22). **b)** Highlighting arborescences in *Evryali* (1973). Source: *Evryali*, meas. 65-69 (Xenakis, 1973) – © Éd. Salabert. **c)** An arborescence in «*Claviers*». Source: *Pléïades*, «*Claviers*», meas. 101-102 (Xenakis, 2013) – © Éd. Salabert.

Xenakis produced several processes to apply the arborescences and by consequence different sections of *Pléïades* could be characterized as a kind of progressive development of their presentation, as a continuous discourse based on the recurrent complexification of the structures and densification of "tree-like shape" materials. The denser arborescent treatments generate what Xenakis called "clouds of sounds", another kind of shape that characterized an important texture appearing

recurrently throughout the piece. Although arborescences and clouds are not the same concept, there is a connection in *Pléïades* established between these terms, and also including waveform melodic structures (as will soon be further explained). The phenomenon of cloud is mentioned in its introduction when the composer affirmed:

> Thus, small variations of the cadence produce an internal liveliness of the rhythm without invalidating the fundamental period. Bigger and more complex variations of the initial period create a disfiguration, a negation of the fundamental period which can lead to its immediate non-recognition. Stronger variations, even more complex, or what often amounts to the same thing, due to the chance of a particular stochastic distribution, leads to total arrhythmia, to a massive knowledge of the event, to notions of clouds, nebulae, galaxies of dust of strokes organized by the rhythm.[13] (Xenakis, 1979, p. i).

This "total arrhythmia"[14] of an event is caused by the perception that the attacks are not metrically connected, being consequence of complex odd rhythms being superposed and bringing the notion of cloud. From the beginning of his work, Xenakis had a special interest and attention in the texture of clouds. Since *Pithoprakta* (1955-1956), one of his first orchestral pieces, the composer explored this concept of distribution of sounds in many opportunities. As he mentioned in a 1989 interview:

> the question of how to lead from one timbre to another in the orchestra was already being posed in the nineteenth century; the subject is treated in text-books of the period. Brahms came up with some very good solutions. Today, however, this has been submerged by the polyphonic approach of serial music, even by me, in my stochastic music, where clouds of sounds replace the polyphonic patterns. I think this has been my main contribution to contemporary music: masses of sounds controlled like clouds by means of probabilities that shape the clouds statistically. That was, let us say, another direction. (Varga, 1996, pp. 141-142).

When considering cloudy, arborescent and waveform elements used as musical structures by Xenakis, their connection with visual designs, shapes and forms is significant. The composer was directly working on the exploration of connections of their primary perception by the sight and their consequent application on music to be perceived by the hearing. As he stated:

> Shapes are everywhere at various levels, forms corresponding to some inner necessity.
> They're sometimes close to all sorts of projections of our mind. When you say cloud – all right, but a cloud of what? Of mosquitoes – that's one example. Or a cloud of vapour in the sky. Or a cloud of people – that is, a crowd. Or a flock of sheep. The cloud, then, is a form that occurs in many places. How to produce one or how to make it change is an intriguing question – it wasn't one that music was concerned with because it didn't have the necessary tools until I arrived [*laughs*] and realized that ideas and techniques used in science - that is,

[13] "Or, de petites variations de la cadence produisent une vivacité interne du rythme sans infirmer la période fondamentale. De plus grandes et complexes variations de la période initiale créent une défiguration, une négation de la période fondamentale qui peut conduire à sa non reconnaissance immédiate. De plus fortes variations, encore plus complexes, ou ce qui revient souvent au même, dues au hasard d'une distribution stochastique particulière, conduit à l'arythmie totale, à une connaissance massique de l'évènement, à des notions de nuages, nébuleuses, galaxies de poussières de coups organisés par le rythme." (Xenakis, 1979, p. i).

[14] This notion of "total arrhythmia" will be also better discussed in Subsection 5.3.5, being compared to the notion of metricity.

> probabilities and the statistical approach - could be employed.
> I believe that is what is lacking today: a theory about shapes. Perhaps in twenty, thirty, forty years' time, fundamental shapes will be classified, along with their applications and expressions in different fields of observation and production.
> Another fantastic shape is that of trees. Arborescences. Veins and nerves have that shape. Lightning has it. All software is based on a tree-like construction. This is another widespread form. And what's the meaning of a line? How does it come about? It's as if a point gave birth to a next point and so on until you get a fine. What is a line of electromagnetic field, or of a photon that travels in space? What does it mean? (Varga, 1996, pp. 206-207).

By mentioning this "theory about shapes", Xenakis directly expressed his own need to classify structures that interested him in a compositional application. He was thus literally pointing out the elements that must be considered and understood during analytical approaches of his works. In *Pléïades,* it is perceptible that waveforms, arborescences and clouds recurrently manifest and present a sort of constant transformation of one into another. In these terms, a cloud is produced with internal properties typical and consequential of arborescent structures and/or waveform melodic structures (Fig. 5.6).

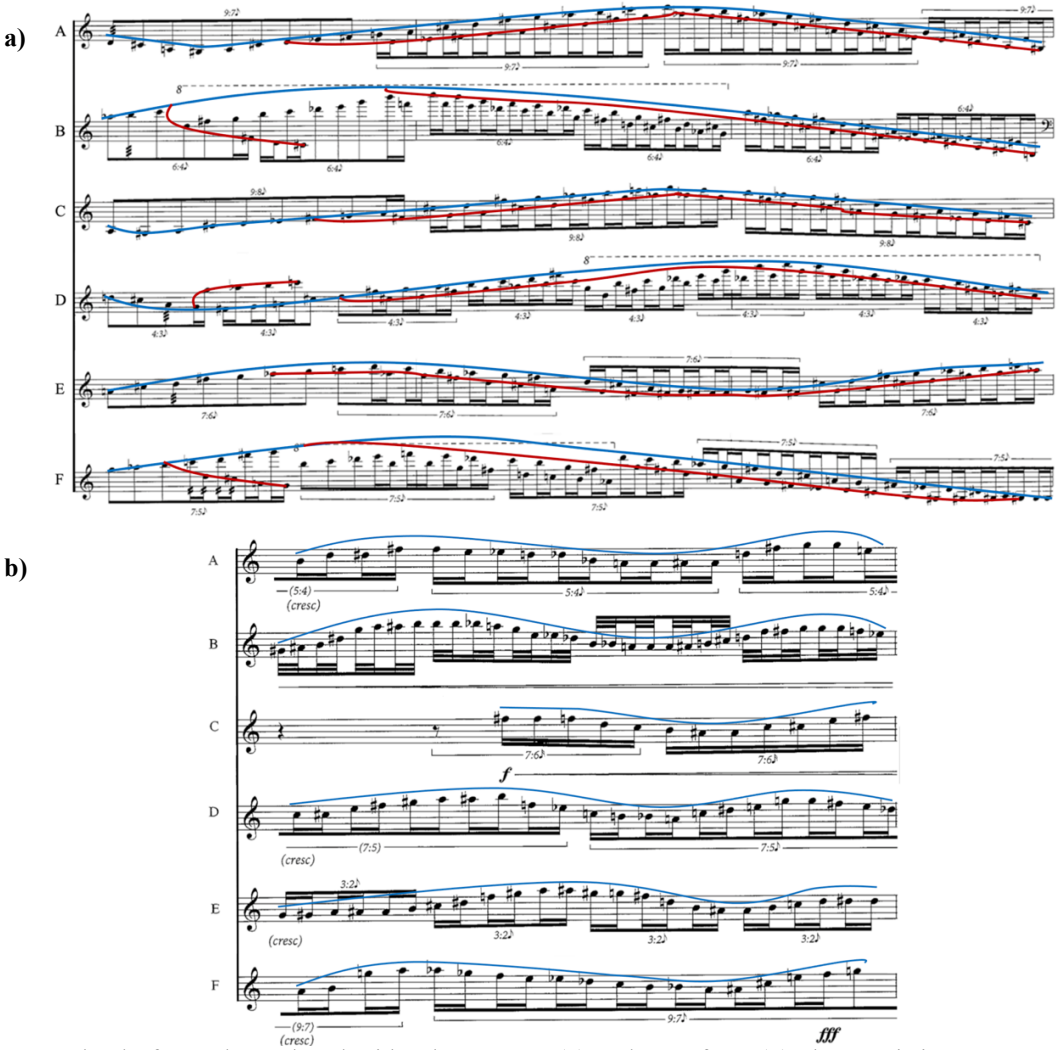



***Figure 5.6***. Cloud of sounds produced with arborescence (**a**) and waveform (**b**) characteristics. **a)** Source: *Pléïades*, «*Claviers*», meas. 104-106 (Xenakis, 2013) – © Éd. Salabert. **b)** Source: *Pléïades*, «*Métaux*», meas. 94 (Xenakis, 2013) – © Éd. Salabert.

It is clear that to a certain degree, those shapes are relatively ambiguous and that a same excerpt could be represented by two different shapes (Fig. 5.7). Many examples in *Pléïades* have excerpts that could be classified by a kind of shape. It indicates that, more than literal images, both shapes were creative stimuli to the development of melodic profiles, their development in time and variations. In this perspective, the "theory about shapes" that the composer described would be a way to understand how images and sounds could create dialogues, interconnective structures and particular characteristics.

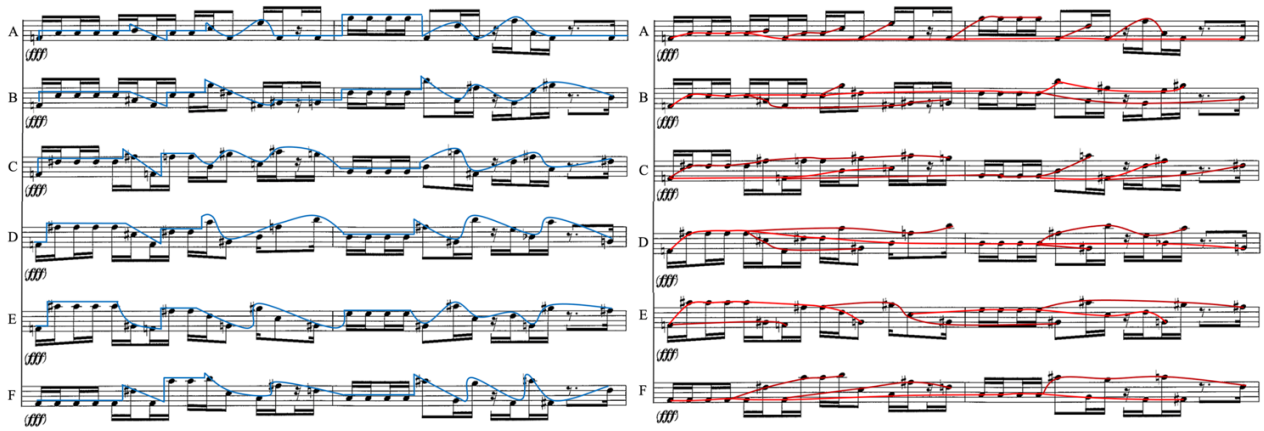



***Figure 5.7***. Comparison of a same excerpt with two possible shapes associated (waveform in blue and arborescence in red). Source: *Pléïades*, «*Métaux*», meas. 167-168 (Xenakis, 2013) – © Éd. Salabert.

The composer is therefore using all these structural elements, their interconnections and transformation of one into another to continuously produce a coherent and extreme variability during the piece. As Xenakis himself stated, "the idea of arborescences is closely linked to causality, repetition and consequently variation" (Varga, 1996, p. 88). The same principle is equally valuable for waveform and cloud shapes, all being elements thus recurrently modified in a constant transformation and interaction of forms. As a result, there are strong correlations to the concept described in the introduction of *Pléïades* about "recurrence, copy, faithful, pseudo-faithful, unfaithful", of which also has direct implications in the general description and conception of the SIX-XEN. The sound halo, of which will now be addressed, is equally based on these concepts and is fundamental to the understanding of this piece.

### 5.2.3 Sound halo

The Section 3.3.4 had initially addressed this specific texture and highlighted the historical context of its apparition in the composers' production and the development of its main characteristics. The sound halo was initially described in Chapter 3 because it presents strong correlation with a main fundamental principle in the description of the SIX-XEN by Xenakis, something that imposes very

specific results in terms of construction and timbre. When considering cloudy, arborescent and waveform elements used as musical structures by Xenakis, their connection with visual designs, shapes and forms is significant. Thus, in this context, when this term appears during the analysis of *Pléïades*, it signifies a heterophonic texture produced by melodies that present the same material but with some degree of perceptible variations. For Xenakis, this texture was defined in the introduction of *Nekuia* by "multiplicities of shifted melodic patte[r]ns, like a kind of artificial reverberation." (Xenakis, 1981, p. ii). It is thus manifested by differences that generally occur in the rhythmic or melodic plan, but that can be perceived as variations of the same material. As a result, it is the product of a concomitant exposition of a theme subtly varied in the superposed layers or a specific melodic sequence that is presented simultaneously with its copies that are rhythmically in phase.

### 5.2.4 Sieve theory

As previously mentioned about waveforms, arborescences and clouds, the musical structures are considered by Xenakis as horizontal and vertical gathering of points and data that are driven by specific parameters and can be organized following pre-established visual plans or specific shapes that can be deducted, developed, modified or conducted by mathematical references (in terms of specific theories, formulas and principles). This also implicates that different parameters, structures and sonorities could be developed based on the same references having a common theoretical and conceptual ground. In this perspective, in the 1970s, Xenakis was using a specific set of mathematical methods that allowed him to operate in multiple layers with the same principles, and that would be fundamental during the production of *Pléïades*. This approach was based on the sieve theory, and he developed it as a compositional technique, applying it in numerous stages of his production while addressing it in numerous publications, and it ultimately became one of the most important parts of his theoretical contributions. As he mentioned in 1989:

> The sieve theory helps in the selection and organization of points of a line. The line represents any characteristic of sound which has an ordering structure (time, pitch, intensity and/or density, and degree of disorder if we work with clouds of events; also, the smoothness of sound [...]).
> The question, then, is how to organize sets of the characteristics of sound. Let us take pitch, for example, which is outside time and a well-known characteristic. How to select certain values – in other words, how to produce a scale? After the disintegration of tonality Western music used the totality of the chromatic scale without making any difference between the individual notes. It led to a deterioration in the quality of music because the chromatic scale is neutral. In order to get a more interesting, more complex scale, we have to choose between the notes. (Varga, 1996, p. 93).

To answer this question, the composer worked with mathematical methods that could present numeric solutions and exact formulas governing the inclusion or exclusion of elements in a particular group of notes. It would be used for different parameters, but it is noticeable that the main quotations

and references that the composer elaborated upon were pointing to the construction of scales[15] and pitch collections that Xenakis generally called sieves:

> Well, the sieve theory can be applied not only to pitch but also to any other structure like time, intensity, the degree of order or disorder, density, and other characteristics of sound. A sieve structure is nothing more than the basic axiomatics starting with the sensations, as described [on Formalized Music]. This gives you the formal construction starting from the sensations of a simple sieve, which is the equivalent of the chromatic well-tempered scale. You have an element that you repeat indefinitely and you thus create the elements of your set, your complete range. Now the next step is a problem of choosing points. In a straight line you have a continuity of points; in the sieve don't. You start from the other end, that is, discontinuity. [...] What the sieve theory enables you to do is to choose in a totally ordered set, or to structure the elements of the set. By comparison, this is what happens in the major scale, the white key scale, or any other more or less complicated scale. This ordered set depends on an elementary displacement; it could be a quarter tone, or a comma, or anything you want. This process represents a very general way of structuring an ordered set. Even the time, for instance, can be designed this way because it is an ordered set. (Zaplitny, 1975, p. 97).

He would use these specific sieves in many pieces by expanding, transposing, modifying or adjusting. As Exarchos (2007, p. 142) complemented about it:

> Sieves that appear in different compositions are in most occasions versions of the original. An interesting aspect of sieve analysis is encountered when analysing different versions of the same sieve, as this might reveal compositional decisions relating to certain aspects of the sieves. The transformations that Xenakis applied to his sieves range from cyclic transposition, which maintains the intervallic structure, to manual alterations such as omitting, adding, or changing one or more elements or segments (thus changing the intervallic structure). In the latter case, analysis can reveal properties common to different versions and thus enable results concerning the construction of sieves.

Xenakis appeared to have imagined the application of the theory for the first time when living and working in Berlin from October 1963 to June 1964. He participated in the DAAD Artists-in-Berlin Program (*BKP–Berliner Künstlerprogramm des DAAD*) with the support of the Ford Foundation. During his stay in Berlin, he worked on electronic music and researched compositional processes guided by computer-based processing of data, being in direct cooperation with the Electronic Studio at TU Berlin (*Technische Universität Berlin*). Even his initial interests emerged at this time, it would be some time to truly achieve a practical application of its principles in a specific piece. As Solomos (1996, pp. 87-88) summarized it:

> [...] its development dates from the Berlin period (early 1960s). However, [...] the composer had other theoretical projects during this period (group theory) and that is why it is eclipsed. In the 1970s, as with the glissandi period, continuity (Brownian movements and arborescences) dominates again: the sieves are put aside. It was not until 1977 (*Jonchaies*) that they re-emerged and took center stage.[16] (Solomos, 1996, pp. 87-8).

[15] Even the specialists reinforce that. Exarchos (2007, p. 54), e.g., stated that "The theory mainly concerns the creation of scales, arrived at through the combination of residue class sets. [...] The importance of this technique to Xenakis is fundamental; it has provided him with a method for 'filtering' elements in order to create and manipulate structures."

[16] "[...] son élaboration date de l'époque de Berlin (début des années 1960). Cependant, [...] le compositeur a d'autres projets théoriques durant cette période (théorie des groupe) et c'est pourquoi elle y est eclipsée. Dans les années 1970

As previously mentioned, *Jonchaies* and *Pléïades* share a common sieve, or intervallic structure, that has also direct connections with the travel to Indonesia in 1972-1973. The mathematical principles of the sieve theory will not be presented in the present research work because they can be consulted with more details in Xenakis references and other sources[17]. Here, it is more crucial to perceive the correlations of this compositional technique with the Indonesian musical traditions, of which was fundamental for the first sieve used by Xenakis and what may even be the factor inspiring him to incorporate it in his other works. Because the sieve theory allowed for the creation of new pitch collections, it is clear that the relation with gamelan music would occur by the means of the scales. As Xenakis himself mentioned in 1989:

> When I was writing a piece I would ask myself, "But what scales do I use? Why do I have the right to choose any note or any instant in the time dimension? No nor that by doing so are structures already involved? I act as if the dimensions of time and pitches already have a structure, which is that of chromatic succession and continuum, why?" You only have to cast a glance at the musics of all cultures to realize that scales always play a fundamental role: in India, in Japan, in Java, in Europe, in Africa, and God knows where you always find scales with their leading function. Now, a musician today cannot act as if those things are accepted once and for all; it has to reflect on these fundamental data. When you create a rhythm, which is a somewhat more abstract entity than durations, you are forced to choose durations, but by which criteria?
> You inevitably find yourself superimposing your choice on a continuum; you assume that time is a continuum and you make your choices on that. One could go further, however, to make one's choices on a predetermined selection: that is, not to accept that time is continuous but to think that it contains distinctions if only because of the differential threshold. One should therefore go further and construct scales. It is with this purpose that I developed the "Sieve Theory." The idea of the sieve is indeed valid for all the characteristics of sound that form an ordered whole: for pitches, for tempos, for intensities and, only partially, for timbres. So, I worked to formalize this and develop a theory that would allow me to construct any kind of scale [underline added].[18] (Restagno, 1988, pp. 24-25).

domine à nouveau, comme avec l'époque des glissandi, la continuité (mouvements browniens et arborescences) : les cribles y sont mis de côté. Il faudra donc attendre 1977 (*Jonchaies*) pour qu'ils ressurgissent : ils occuperont désormais le devant de la scène." (Solomos, 1996, pp. 87-8).

[17] To mention a few: Xenakis (1990, 1992a, 1994), Gibson (2001), Ariza (2005), Exarchos (2007), and Besada, Barthel-Calvet, & Cánovas (2021).

[18] "Quando scrivevo un pezzo mi domandavo: «Ma che scale uso? Perché ho il diritto di scegliere una nota qualsiasi o un istante qualsiasi nella dimensione tempo? No nè che cosi facendo sono già implicate delle strutture? Io mi comporto come se le dimensioni del tempo e delle altezze avessero già una struttura che è quella della successione cromatica e del continuo, perché? Basta gettare uno sguardo sulle musiche di tutte le culture per rendersi conto che le scale svolgono sempre un ruolo fondamentale: in India, in Giappone, a Giava, in Europa, in Africa e Dio sa dove ritrovi sempre le scale con la loro funzione protagonistica. Ora, un musicista di oggi non può comportarsi come se quelle cose fossero accettate una volta per tutte; deve riflettere su quei dati fondamentali. Quando crei un ritmo, che è un'entità un po' più astratta di quella delle durate, sei costretto a scegliere delle durate, ma con quale criterio?».
Ti trovi inevitabilmente a sovrapporre la tua scelta ad un continuo, supponi che il tempo sia un continuo e su questo fai le tue scelte. Si potrebbe però andare più lontano a fare le proprie scelte su una selezione prestabilita: non accettare cioè che il tempo sia continuo ma pensare che contenga delle distinzioni non fosse altro che a causa della soglia differenziale. Bisognerebbe dunque procedere oltre e costruire delle scale. E con questo scopo che ho elaborato la "Teoria del setaccio". L'idea del setaccio è infatti valida per tutte le caratteristiche del suono che formano un insieme ordinato: per le altezze, per i tempi, per le intensità e, solo in parte, per i timbri. Cosi mi sono adoperato per formalizzare tutto questo ed elaborare una teoria che mi permettesse di costruire qualsiasi tipo di scala [underline added]." (Restagno, 1988, pp. 24-25)

In this light, the sieve theory allowed Xenakis to access a certain degree of universals in music, an idea of which he was concerned about and had been searching for. By gathering typical elements of different cultures and achieving his own new material by the means of the sieves, he produced not only many new pieces, but he expressed a new stage of his work through developing new compositional techniques. Xenakis searched for long-term ways to consider the music in a broader way, by reproducing vast natural, physical and mathematical phenomenon in its interior and expressing what could represent the fundaments of a domain intrinsically integrating art and science. This search for universal ideas was a broad attempt to answer questions that originated from both domains. Solomos (1996, p. 88) expressed that "The problematic of the sieves corresponds in appearance to a theoretical preoccupation that Xenakis never abandoned, even if it is no longer expressed with the great impulses of the 1960s: the quest for the foundations of music. This quest, in its ultimate phase, that of the sieves, passes through the concern to restore 'order'."[19] Because of the trip to Indonesia, the composer found a new inspiration to revisit questions about scale, timbre, polyphony, tension, melodic and harmonic production which prompted him to return to universalist questions about music.

The sieve theory and the *Pléïades*-*Jonchaies*-Indonesian music connection was a Xenakian quest to prove that, through mathematical elements, there could be coexistences of elements from different origins treatable in terms of common parameters. He sought to show that the plurality of existing elements (natural, scientific and artistic) could be integrated into the singularity of a work and that, through complex mathematical principles and dialogues established between different fields and cultures, a true art-science would emerge. Therefore, his doctoral work presented in 1976 and the dialogues of the thesis defense later published (Xenakis, 1979) are notable to show the perspectives of his thinking during the period. In an interview in 1989, Xenakis reiterated the importance of the scale production as a product of specific sieves and referenced a *pelog* scale:

> The structure of the melodic scale is very important, not only in melodic patterns – melodies – but also in producing chords of a different timbre. If you take a given range, and if the structure of the scale is rich enough, you can stay there without having to resort to melodic patterns – the interchange of the sounds themselves in a rather free rhythmic movement produces a melodic flow which is neither chords nor melodic patterns. That, perhaps, is what you mean. They give a kind of overall timbre in a particular domain.
> [...] I gave the example of the pelog to show how the issue of tension needs to be kept in mind in constructing a scale. I didn't intend to say one should imitate any particular one. Tension is important for the melodic patterns, the chords, and for the flow of the music itself. In chromatic and well-tempered scales you can generate tension only through jumps, as in serial music. When the notes are closer to each other, as in the chromatic scale, you lose tension, unless you apply a kind of sieve locally – that is, you choose intervals that produce some

[19] "La problématique des cribles correspond en apparence à une préoccupation théorique que Xenakis n'a jamais abandonnée, même si elle ne s'exprime plus avec les grands élans des années 1960 : la quête des fondements de la musique. Cette quête, dans son ultime phase, celle des cribles, passe par le souci de restaurer « l'ordre »." (Solomos, 1996, p. 88).

tension. (Varga, 1996, pp. 145-146).

The composer mentioned "I didn't intend to say one should imitate any particular [scale]", but he literally used an Indonesian scale recorded in Bali as a part of his sieve for *Jonchaies* and *Pléïades*. Xenakis was not imitating the scale but rather was incorporating it in an attempt to prove that the singularities could be part of a broader system, of which would represent the desired pluralities in *Pléïades*; the entire project was aggregated by the common perspectives turned possible by a "science-arts alloy" that Xenakis finally completely mastered in the second half of the 1970s. The sieve theory was thus making possible a structure that could represent the synthesis of diverse cultures, a sort of "universal structure" that he was referring to as necessary since the 1960s[20].

### 5.2.5 Between periodicity and aperiodicity

The dichotomy here addressed is based on the perception of a stable and common metric correlation between the voices that are oriented by distinguishable beats or in the perception of its total absence. The term *metricity* eminently emphasizes and gathers the sections, subsections, or measures in which there are clear divisions and subdivisions of the time, perceived by a referential pulse as well as common beats guiding and integrating the musicians (Fig. 5.8a and c). The term *arrhythmicity* (a notion based on what Xenakis called as a "total arrhythmia" in the introduction of *Pléïades*), on the other hand, generates a completely different perception, giving the impression that a same pulse for all musicians, or a common metric and beats that guide all the voices does not exist. The arrhythmicity presents a fluidity that breaks any time signature and the fixed rhythmic structures that are based on rigid subdivisions of time, turning the musical materials into an agglomerate of attacks indistinctly placed somewhere in time but not on a perceptible and stable common pulsation. This does not mean that arrhythmicity is not based on metric principles in *Pléïades*, because Xenakis integrates it in a very precise metric (as most of his production is eminently presented in 4/4) with a superposition of odd figures that create a complex polyrhythm different for each musician. The perceptive result is a fluid texture that almost erases the sensation of a common pulsation between the musicians and that creates a sort of aperiodic excerpt (as indicated in Fig. 5.8b and d). It gives the sensation that, even if the time exists, its divisions and subdivisions are completely annihilated and unheard by the ear. This intense perception with imbricated layers distorts what the audience can perceive as to what each musician is effectively executing. The individual voice disappears and

[20] Remembering that, as Veneración (1967, p. 108) stated about the International Symposium Musics in Asia (1966), "During the free discussion, Mr. Iannis Xenakis, composer, felt that there seemed to be a confusion in music which may be resolved by seeking for a universal structure which in turn can be separated into a time structure and a temporal structure [underline added]." See more details in Chapter 1–Section 1.1.4.

merges into a unique amalgamed mass of aperiodic sounds in which their relation to metric processes decomposing time is essentially unachievable by the perception.

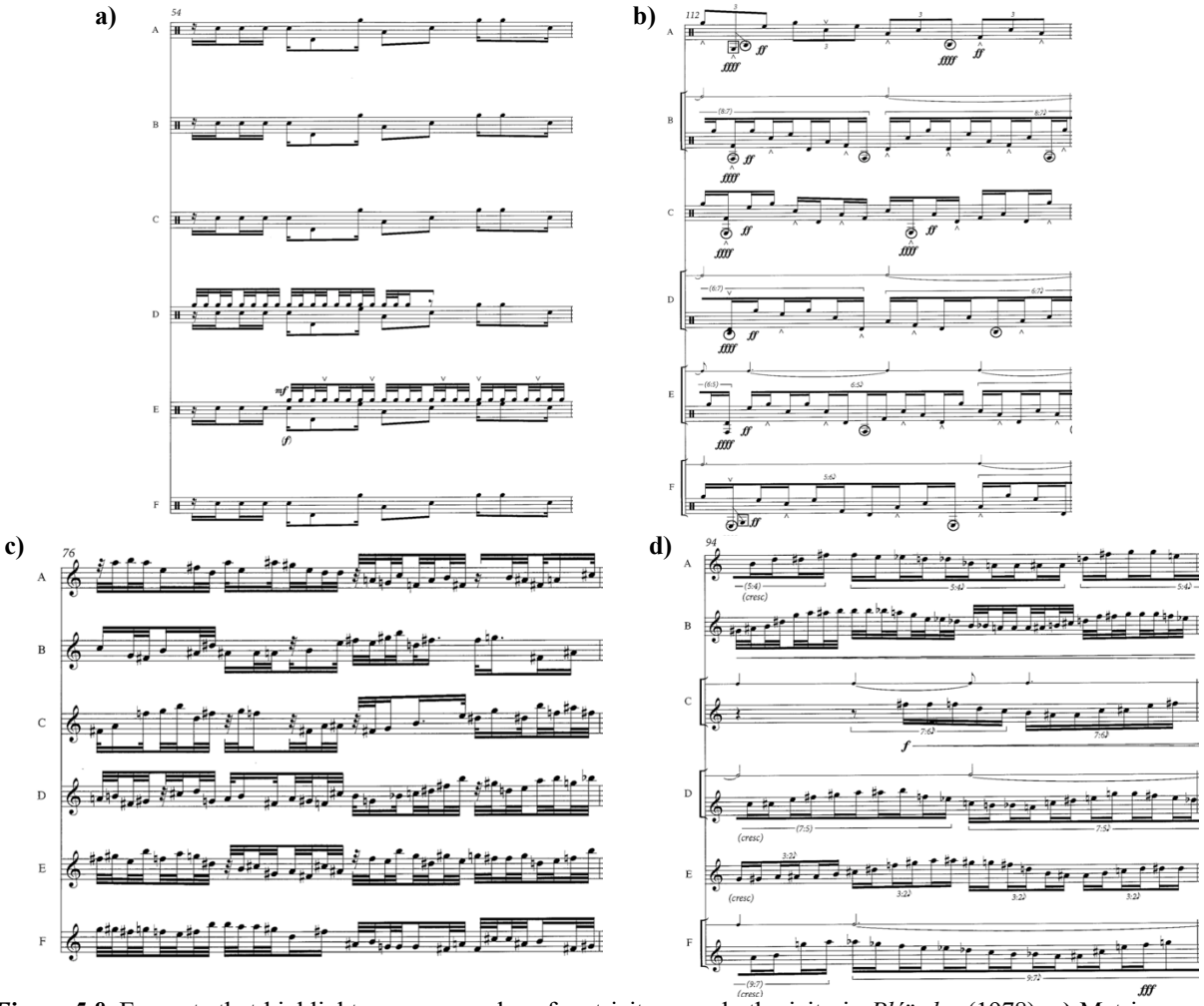



***Figure 5.8***. Excerpts that highlight some examples of metricity or arrhythmicity in *Pléïades* (1978). **a)** Metric excerpt. Source: *Pléïades*, «*Peaux*», meas. 54 (Xenakis, 2013) – © Éd. Salabert. **b)** Fluid excerpt. Source: *Pléïades*, «*Peaux*», meas. 112 (Xenakis, 2013) – © Éd. Salabert. **c)** Metric excerpt. Source: *Pléïades*, «*Métaux*», meas. 76 (Xenakis, 2013) – © Éd. Salabert. **d)** Fluid excerpt. Source: *Pléïades*, «*Métaux*», meas. 94 (Xenakis, 2013) – © Éd. Salabert.

Xenakis did not work exclusively with a specific type for each movement; rather, he imbricated these textures throughout all movements, with some movements more characterized by one type or the other. He created different ways to alternate between metricity and arrhythmicity. In certain excerpts, he abruptly interrupted one fluid passage with a sudden metric texture or made the opposite (Fig. 5.9), and sometimes he worked on progressive transformations of one to another as verifiable in the meas. 95 to 109 of «*Peaux*».

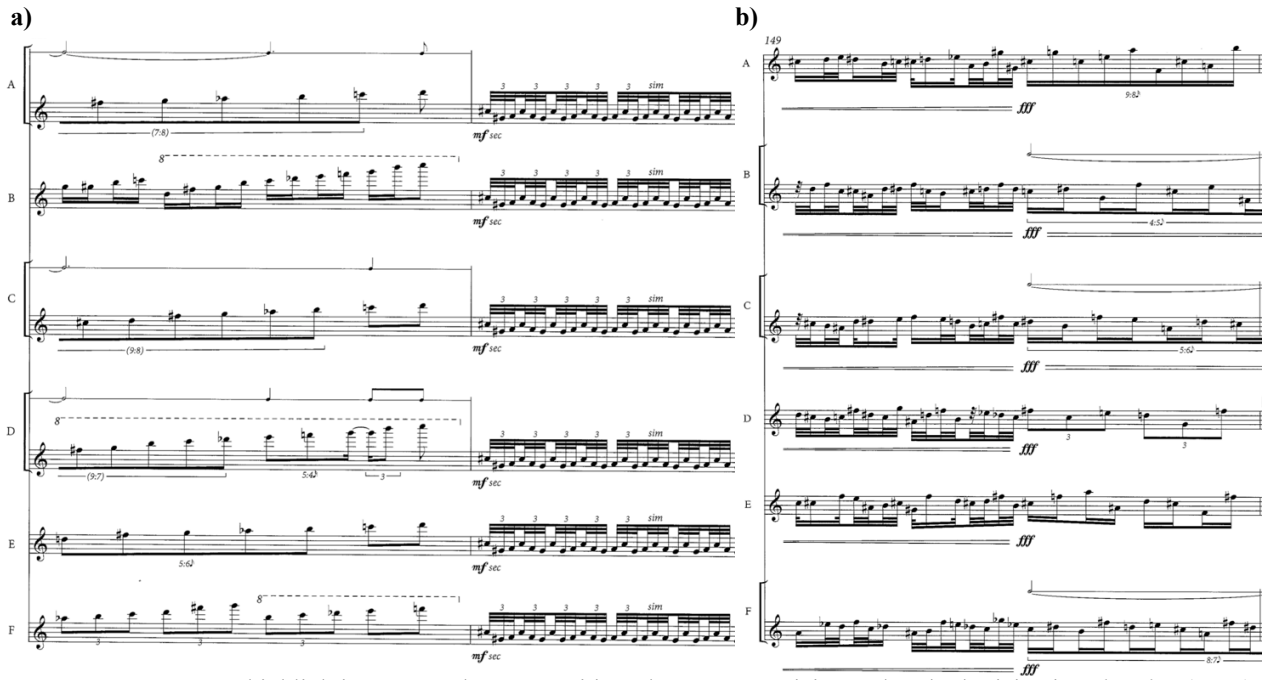



***Figure 5.9***. Excerpts highlighting some abrupt transitions between metricity and arrhythmicity in *Pléïades* (1978). **a)** From a fluid to a metric excerpt. Source: *Pléïades*, «*Claviers*», meas. 110-111 (Xenakis, 2013) – © Éd. Salabert. **b)** From a metric to a fluid excerpt. Source: *Pléïades*, «*Métaux*», meas. 149 (Xenakis, 2013) – © Éd. Salabert.

As will be discussed later, the use of these two terms during the analysis of the movements will be relevant to «*Peaux*» and «*Métaux*» (and by consequence, in specific passages of «*Mélanges*») than «*Claviers*» (that it is in itself almost totally based on arrhythmicity).

The definition of metricity is also characterized by a division in two sub-elements that can be clearly perceived and that are important in the context of *Pléïades*: the commetricity and contrametricity. These two terms were coined by Mieczyslaw Kolinski in 1973 in a text that addressed the challenges that could be presented in the notation of traditional music orally transmitted, as well as in the perception of music that is mainly transmitted by a writing tradition[21]. Kolinski also discussed the ambiguities that could be generated between the writing and the perception of a determined metric when polyrhythms are intensively applied. To clarify these definitions, he stated in a later article:

> Another significant aspect of socio-cultural diversification is the antithesis of *commetricity* and *contrametricity*, bridged by an extensive latitude between strongly *commetric* and highly *contrametric* structures. Any configuration of a dynamic, melodic, multisonant, durational, or other nature that underlines the metric organization may be qualified as commetric, while

[21] As he stated in his introduction: "It is obvious that an application of specifically Western concepts to non-Western musical styles will result in a more or less distorted assessment of the musics involved. In the case of metro-rhythmic patterns the situation becomes all the more disturbing since, as we shall see, even with regard to our own music certain aspects of the current views on the nature of metro-rhythmic structure are quite controversial. Therefore, an essential precondition for an adequate broadly comparative metro-rhythmic analysis is a re-evaluation of these approaches, designed to pave the way for an appropriate cross-cultural investigation of metro-rhythmic patterns." (Kolinski, 1973, p. 494).

> any such configuration that tends to upset the metric organization may be qualified as contrametric. (Kolinski, 1978, pp. 241-2).

In the context of *Pléïades*, commetric and contrametric structures were intensively used by Xenakis throughout «*Peaux*» and by consequence in the specific recapitulations in «*Mélanges*», while also appearing in «*Métaux*». This is exemplified in some passages, such as the excerpts indicated in Fig. 5.10.

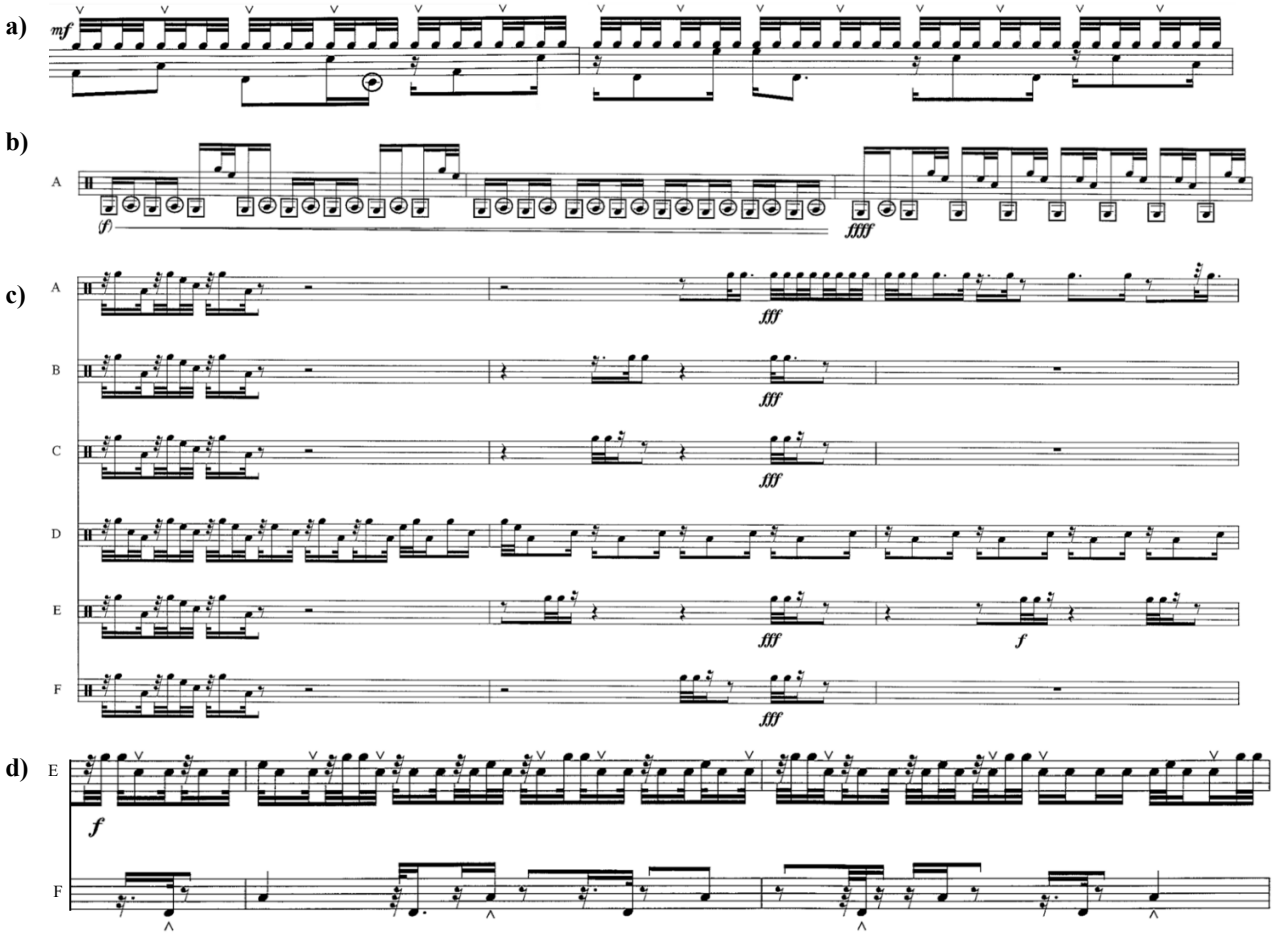



***Figure 5.10***. Examples of commetric (**a** and **b**) and contrametric structures (**c** and **d**) in *Pléïades*. **a)** Source: *Pléïades*, «*Peaux*», meas. 49-50, tutti (Xenakis, 2013) – © Éd. Salabert. **b)** Source: *Pléïades*, «*Peaux*», meas. 71-73, Player A (Xenakis, 2013) – © Éd. Salabert. **c)** Source: *Pléïades*, «*Peaux*», meas. 3-5 (Xenakis, 2013) – © Éd. Salabert. **d)** Source: *Pléïades*, «*Peaux*», meas. 9-11, Player E and F (Xenakis, 2013) – © Éd. Salabert.

In the case of Xenakis' entire works, metricity and arrhythmicity, periodicity and aperiodicity, as well as commetricity and contrametricity, are concepts that can be seen throughout his production. Metricity and arrhythmicity, and commetricity and contrametricity, were sources of diversification of materials for Xenakis, and because *Pléïades* is essentially a piece about multiplicity, diversity, plurality and variety those metric concepts will be emphasized as a comparative element between movements.

## 5.3 Terminology

With the previous terms defined and discussed, it is now important to consider how a specific terminology is appropriate to address the main issues of the present analysis. In the material drawn on millimeter paper presenting *Pléïades* almost completely (Milestone 2), Xenakis adopted lowercase Greek letters to designate specific musical elements. He used them occasionally for different passages like sections, subsections and varied repetitions for example (Fig. 5.11a), melodic profiles (Fig. 5.11b or c) or pitch collections (Fig. 5.11d) or even to describe the initial concepts about the SIX-XEN (Fig. 5.11e).

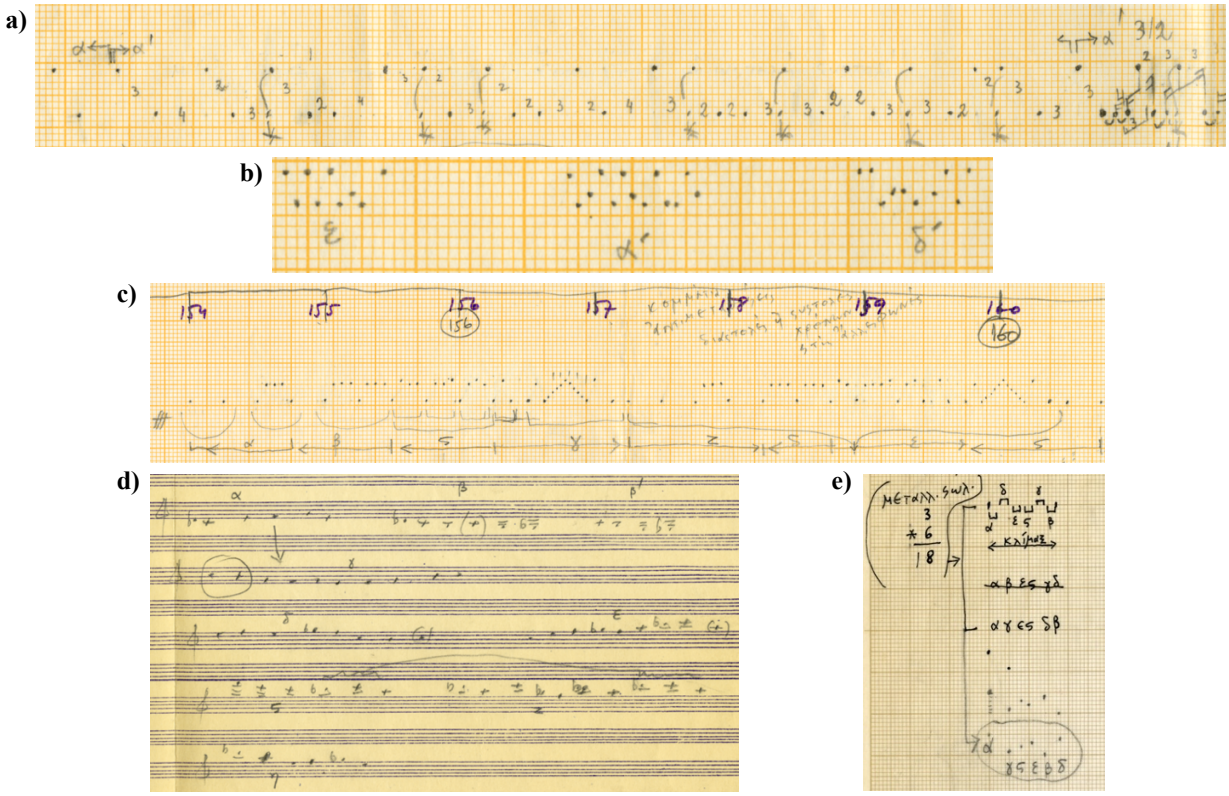



***Figure 5.11***. Part of the manuscripts of *Pléïades* showing structures classified by Xenakis while working on it. **a)** Excerpt from «*Métaux*»–Meas. 39-45, player B. Source: © Famille I Xenakis DR (OM 28-17, p. 3). **b)** Variations on different melodic ideas from a footnote in «*Métaux*». Source: © Famille I Xenakis DR (OM 28-17, p. 3). **c)** Excerpt from «*Métaux*»–Meas. 154-160. Source: © Famille I Xenakis DR (OM 28-17, p. 8). **d)** Variations on different melodic ideas for «*Claviers*». Source: © Famille I Xenakis DR (OM 28-17, p. 22). **e)** Initial concepts and variations of the sound of the SIX-XEN. Source: © Famille I Xenakis DR (OM 28-17, p. 15).

He then applied the same initial letters of the Greek alphabet for substantially different elements throughout the piece. It appears that he utilized this as a reminder to vary structures or ideas while he composed, and not as a precise and methodical terminology of compositional structures and materials. Consulting his initial notes and drafts, one can thus perceive that his classification is neither

systematic or exhaustive, restricting itself to a few denominations that often designate different elements.

To help an understanding of *Pléïades* characterization, some terms will be here used to refer to aspects that seems substantial, and they will guide a coherent terminological application during the analysis. Sections and subsections will be named with capital letters and numbers depending on their internal subdivisions (A1, A2, B1, B2, e.g.) and they will be formally considered to allow future comparisons with other analytical perspectives.

The melodic profiles will be named with lowercase Greek letters and Arabic numerals (with possible variations to be indicated, as α1, $\beta 2^{I}$, e.g.). These melodic profile indications will respect their order of appearance and the development that they manifest in relation to the monotimbral movement in which they are initially used. Thus, these lower-case Greek letters will be adopted here to indicate specific recurrent and motivic profiles throughout a movement and will help in determining tendencies of passages and structures, which can be compared when considering two different movements.

Because of the main recapitulative characteristic of «*Mélanges*», when melodic profiles are discussed, there will be a mention of the original movement with a capital letter of the monotimbral origin (C for «*Claviers*», P for «*Peaux*» and M for «*Métaux*»). Thus, the designation α1 originally present in «*Claviers*» will become Cα1, or $\beta 2^{I}$ coming from «*Métaux*» will become $M\beta 2^{I}$ when considered in «*Mélanges*». As a last need of nomenclature, the rhythmic motives presented throughout the work will be named according to their characteristics as indicated by Xenakis in relation to the Greek poetic metric (the anapest and dactyl motives essentially).

# Chapter 6. Formal analysis of *Pléïades:* Initiating the atmospheric entry into a sonic space

The predominant focus on the SIX-XEN may lead the analyst to consider «*Métaux*» and «*Mélanges*» as the only movements that demonstrate the understanding of the instrument in Xenakis' compositional approach. However, as it will here be exposed, the remaining two movements («*Claviers*» and «*Peaux*») are also fundamental to conceptualize the entire subject. The following analysis will consider all four movements because to understand the SIX-XEN in the piece, it is important to consider the materials that are presented in each movement and how they are interconnected with «*Métaux*». Thus, it is by comparing how Xenakis treated the instruments, the textures and specific structures in the entire piece that the SIX-XEN can be better understood in the context of its particular conceptualization and practical interpretive implications.

The current chapter will address a double bias of Xenakis' attitude when composing with the then-new instrument. Firstly, the analysis will highlight how the composer treated the SIX-XEN in the two movements in which it appears («*Métaux*» and «*Mélanges*»). Secondly, bellow chapter seeks to correlate the instrument with the treatments that are organized all over the work. Finally, the whole discussion will underline that this double bias directly correlates with various aspects coming from traditional Indonesian music (of which will be reinforced and reiterated by complementary perspectives in the Chapter 7). The analysis will follow the order of the movements («*Claviers*», «*Peaux*», «*Métaux*», and «*Mélanges*») in all the editions of the complete score.

## 6.1 «*Claviers*»

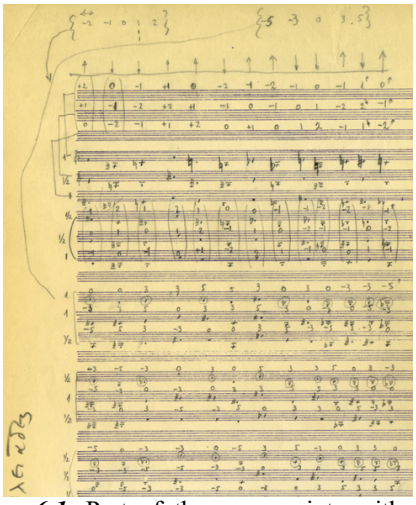
As a first step to understand «*Claviers*», it is necessary to specify three fundamental elements of the movement: the timbres used, the pitch structure throughout its development (based primarily on sieve theory), and the melodic profiles (based on specific shapes). The instruments present in the movement are percussion keyboards, of which have defined pitches and tuning based on equal temperament. Among the instruments of Les Percussions de Strasbourg at his disposal, Xenakis chose three vibraphones (for players A, C and E), marimba (player B), xylophone (player D) and xylomarimba (player F). With these instruments, the composer was clearly exploring the melodic and harmonic possibilities available, while equally working on timbral aspects with a relative[1] balance between metallic (vibraphones) and wooden instruments (marimba, xylophone and xylomarimba).

[1] "Relative" because, as it will be shown, the metallic timbres have a clear predominant presence in different sections.

Throughout movement, the subgroups gathering players ACE and BDF demonstrate certain internal coherences and mutual correlations (of which are reinforced in the recapitulation of «*Mélanges*»), and it is based on this timbral treatment and the chosen pitches that specific melodic profiles are developed. These three elements (subgroups, timbre and melodic profiles) are the main points to separate and classify the sections and subsections during the present analysis.

When initially working on this movement (milestone 1), Xenakis designed two essential elements: the possibilities of melodic irradiation by semitones, based on combinatory and permutation (Fig. 6.1a), and the pitch collection, based on the sieve theory (Fig. 6.1b). The first element was specifically used in the introduction of the movement to develop the melodic evolution by irradiance of semitones in prefigured directions, that resulted in a material exclusively used with vibraphones (simultaneously with the first sound halo of the movement). The pitch and intervallic collection that would be used was based on the sieve used the previous year in *Jonchaies* (1977) for orchestra. After these first two sketches for «*Claviers*», the composer had all necessary material and proceeded to work directly on millimeter paper (milestone 2), phase in which he passed to the composition of the movement as a whole. However, few materials were found regarding milestone 2, highlighting that several sketches Xenakis produced intensively during this stage may have been destroyed or given away (which occurred with other pieces). Another possibility is that he produced only one page of sketch on millimeter paper and developed everything else directly on stave (milestone 3).

**a)**



**b)**

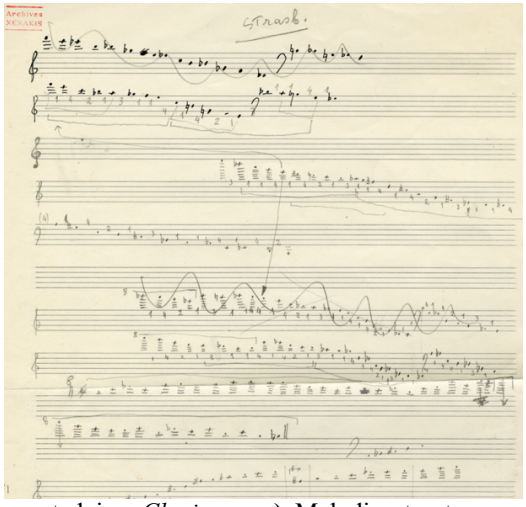


***Figure 6.1***. Part of the manuscripts with materials presented in «*Claviers*». **a)** Melodic structures applied to the vibraphones during the introduction of the movement. Source: © Famille I Xenakis DR (OM 28-17, p. 22). **b)** Notes about the sieve used in almost the entirety of the movement. Source: © Famille I Xenakis DR (OM 28-17, p. 23).

In a first overview of the movement, it is clear that Xenakis is eminently presenting melodic lines in a polyphonic treatment, demonstrating that although the vertical correlations are significant, the horizontal correlations are more. The texture is generally dense, being the product of the six voices

almost treated as a continuous flux of notes that present mainly a waveform contour. The correlations between the six musicians are important and articulate by the use of a same sieve, but it is made by the independence between the comportment and the direction of the voices, which gives an impression that almost everything is based on six infinite melodies with different speeds, due to an almost constant polyrhythmic treatment. The voices occasionally present points of convergence with some temporal connections (structures δ and δ', as later described), but these points are short directional motives and not entirely developed materials. Rather than representing sections or subsections, these short structures are specifically positioned to dynamize the textures and to represent transitions between distinct passages.

The musicians execute one note after the other almost all the time. The moments in which the percussionists play two notes simultaneously are rare, and a real chord by all players only appears as a "last attack" of the entire movement in the last measure. The percussionists are thus eminently required to play continuous melodies in a sort of *moto perpetuo* for six voices of a complex and polyrhythmic polyphony. To understand the melodic structures of «*Claviers*», one must take its vertical development into consideration, exploring specific sequences of pitches of the *Jonchaies* sieve (Fig. 6.2) and the horizontal structure that is deployed by the rhythmic relations throughout the movement.

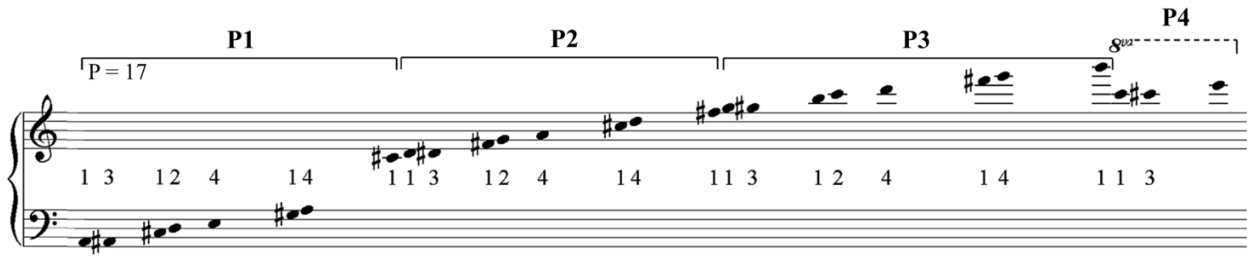



***Figure 6.2***. Sieve of the meas. 1 to 65 of *Jonchaies* (1977).

It is also necessary to consider how both vertical and horizontal structures generate melodic contours that are visually characterized by typical waveforms and arborescences, with clouds of sounds appearing due to complex polyrhythms. It will be thus discussed below how the composer integrated these factors to create varied textures and treatments throughout the movement while also reflected in «*Mélanges*» by recapitulation, but that, above all, has significance in «*Métaux*». The first element to be treated here will be the sieve and the consequent pitch structures that allowed Xenakis to construct the movement specifically and the universe of signification and imagery it represented to him.

### 6.1.1 Pitch collection in «*Claviers*»: a sieve with extra-European references

The sieve used in *Pléïades*[2] is characterized by the sequence of semitones 1 3 1 2 4 1 4 1, that continuously repeats the same disposition of intervals from bottom to top. This periodicity is marked by a sum of 17 semitones (or a period P = 17), covering one octave and a perfect fourth. This kind of structure when repeated in the higher register, presents new pitches on the same degrees of the sieve, being for that reason called non-octaviating (a term used by Xenakis himself). The sequence P = 17 with the disposition of intervals 1 3 1 2 4 1 4 1, as a periodic phenomenon, can also be called an intervallic succession. For example, the sieve presented above (Fig. 6-2) shows three complete intervallic successions and part of a fourth (with three additional intervals) as used in the beginning of *Jonchaies*. For «*Claviers*», Xenakis expanded this material with four more intervals and presented the almost completed fourth intervallic succession. One must also consider how this sieve is characterized on behalf of the different ranges of the instruments that the composer used in this movement (Fig. 6.3).

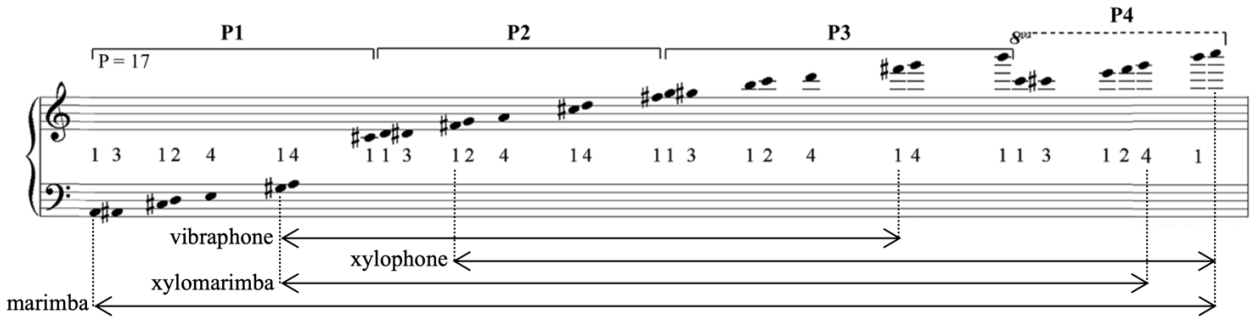



***Figure 6.3***. Sieve of *Pléïades* (1978) and correlation with the ranges of the instruments required in «*Claviers*».

The figure above is based on the image that Xenakis elaborated upon in his manuscripts and reflects the instruments that were part of the instrumentation of Les Percussions de Strasbourg at the time (as is the case with the xylomarimba, for example, an instrument that is no longer commonly produced). Xenakis organized the range of each percussion instrument to perceive which part of the sieve could be applied to each percussion keyboard, which region is common for all, and what are the specifics of each instrument that are available in this sieve disposition. As Fig. 6.3 shows, he used the expansion of the sieve to occupy the entire possible range of instruments that were at his disposal at the time.

This pitch structure based on a sieve of P = 17 is present in almost all the movement. There are only two exceptions to this: in the introduction where he adopted a particular model of melodic

[2] See more about sieve theory in the Chapter 5–Section 5.3.4 and about this specific sieve in Chapter 7–Subchapter 7.1.

development between the three vibraphones and the conclusion where he used the same sieve but with the specific intervallic succession P1 one octave higher (entering the range of P2), as will be detailed later.

When Xenakis stated that this sieve "was similar to the scales of ancient Greece, of the Near East or of Indonesia" (Xenakis, 1979, p. i), he was focusing on two clear aspects of this pitch collection. Firstly, there is a quasi-complete Byzantine scale, or double harmonic scale, that explains the composer's "Near East" reference. Secondly, there is a complete hemitonic pentatonic scale present that explains the "Indonesia" reference and, because this pentatonic has an intervallic structure characterized by a minor second, this presence may also be an indirect reference to a Phrygian mode (explaining the "ancient Greek" aspect that Xenakis mentioned).

With this sieve, the incomplete Byzantine scale (Fig. 6.4) is formed by the semitone sequence 1 3 1 2 4 1, that creates via intervallic disposition a minor second, a major third, a perfect fourth, a perfect fifth, a major seventh and a perfect octave. It is also perceptible that this scale repeats notes in the superior and inferior octaves, covering a register of almost two octaves (even if incomplete in many passages). The semitone sequence 1 3 1 2 4 1 4 1 1 presents a repetition of the I, III and IV degrees one octave higher on the last 4 1 1 passage. The intermediary and the higher intervallic successions (P2, P3 and P4) also present their V degree in the octave below.

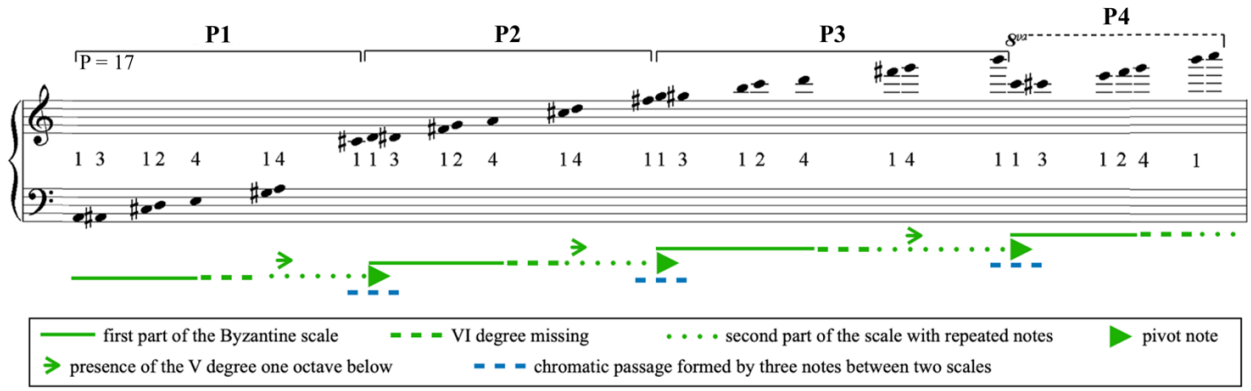



***Figure 6.4***. Sieve used in *Pléïades* highlighting the implicit Byzantine scales (double harmonic scales) that Xenakis inserted in this pitch collection.

The continuity of two sequences could be written as (1) 3 1 2 4 1 4 1 (1) 3 1 2 4 1 4 1 (1), with (1) being an interval characterized with a pivot note between the lower and higher intervallic successions. This pivot note occurs in the previous mode as IV degree one octave higher and the next potential mode as I degree. This passage between two Byzantine scales (e.g., between P1 that presents the Byzantine scale in A, and P2 that presents the scale in D) is additionally reinforced by a subtle chromatic sequence of three notes (1 1) with the middle one as the pivot note. This passage then

represents the tipping point that transforms the scale into a new tonality, situated a fourth above of the previous period (P1 that presents the Byzantine scale in A, P2 in D, P3 in G, and P4 in C).

This incomplete Byzantine scale with some degrees repeated on higher and lower octaves fits perfectly with the sequence of 17 semitones, with the pivot note serving as a passage between the sequences and intervallic succession. Between the previous and the next scale in each intervallic succession, there is a perfect eleventh between each first note, showing a cycle of perfect fourths between each Byzantine scale as the sieve progresses into the higher register.

To have a complete Byzantine scale, it would be necessary that the minor sixth, and the complete semitone sequence be 1 3 1 2 1 3 1, with the central 2 as the specular aspect of the double harmonic created by two identical tetrachords with 1 3 1 semitone sequences. But at the same time, as this sixth degree is missing, its absence allows the emergence of the hemitonic pentatonic scale that Xenakis described as being "very close to the pelog" (Varga, 1996, p. 164). This aspect of the sieve arises from the semitone sequence 1 2 4 1 4, characterizing a pentatonic scale with minor second, minor third, perfect fifth, minor sixth and perfect eight (Fig. 6.5).

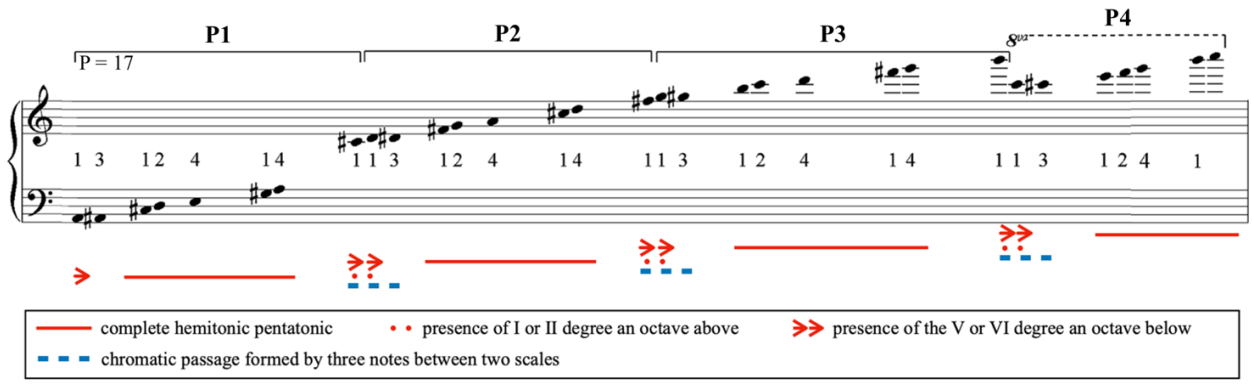



***Figure 6.5***. Sieve structuring *Pléïades* and highlighting the hemitonic pentatonic scale that Xenakis associated in this pitch collection and called it a "*pelog*".

It is perceptible in Fig. 6.5 that a pentatonic scale in a given intervallic succession has repeated notes in the higher octave (I and II degrees) and inferior octave (V and VI degrees), covering a register of an octave and a half (V and VI degrees below + complete scale + I and II degrees octave higher). As occurs in the Byzantine scale, this pentatonic coincides with the intervallic succession of the sieve. Each new intervallic succession presents a pentatonic scale characterized by an ascending fourth cycle (in this sieve the P1 has the pentatonic in C#, P2 in F#, P3 in B and P4 in E), with a chromatic short sequency of three notes (1 1) as a passage in-between. This chromatic passage has two notes in common between two adjacent pentatonic scales, being I and II degrees of the lower one and V and VI degrees of the higher one.

The intervallic sequence that allows the hemitonic pentatonic may also explain why Xenakis stated that it "was similar to the scales of ancient Greece" (Xenakis, 1979, p. i). He may have considered the minor scale characteristic with minor second as a sort of Phrygian scale with his main intervals and sonority exposed, of which was reinforced by Solomos (1996). However, this is again an incomplete scale, because the IV and VII degrees are missing. Even with these degrees included, the resultant scale would be the modern Phrygian scale rather than the ancient Greek.

Comparing all previous structures (whether in terms of a Byzantine, Indonesian *pelog* or Phrygian scale), it is perceptible that the cycles of ascending fourths and the chromatic passage between different intervallic successions recurs throughout the movement. These structures are symmetrical and extremely organized, repeating a kind of intervallic structure that is equal from lower to higher registers. However, the strong presence of inner modal structures did not reflect that Xenakis' music would be guided by the same inherent principles and structural needs typical of modalism. When asked to elaborate on the appearance of modal scales in his music, Xenakis stated in a 1989 interview that:

> They look modal but they're not. So-called modal music was copied in tonal music in the nineteenth century. Composers were influenced by traditional church music following the discovery of old manuscripts in the Abbaye de Solesmes. In Russia, too, the composers of the Five – Musorgsky especially – were influenced by the music of the Russian Orthodox church and also by folk music. That's how so-called modal music became fashionable.
> My work has nothing to do with modal music, but I do admit that it may sometimes create that impression because of the non-tonal or tempered chromatic scale. The problem of the scales which I call sieves is basic to instrumental music and also to sound synthesis. Most composers choose to ignore it. They simply pick up notes as if they were all at their disposal. That's not the case, because they have to think of the basic structure. That's why I think the problem of scales is so important, both from a melodic and a harmonic point of view. (Varga, 1996, p. 159).

Thus, by affirming that these materials "look modal but they are not", Xenakis is clearly indicating that his concern did not regard the gravitational tendencies that some degrees present and the polarization of harmony in terms of specific movements and predetermined sequences that is generally observed in this kind of music. Rather, Xenakis was more concerned about the direct connections between frequencies and timbres than the predetermined steps adopted by conventions in terms of harmony and melody. For Xenakis, there were inherent forces represented by those materials, but not in the perspective of a reproduction of the same melodic and harmonic used by previous generations. Xenakis was thus not considering the use of these materials in terms of degrees, functions, polarized forces of attraction, and harmonic discourse. Instead, what interested him was that the structure could present completely different timbral aspects in each range in which it manifests and in relation to each intervallic succession that it contains. The use of the sound qualities in each register in relation to a specific instrument is also singular to each case, an idea of which was

of great interest for the composer. In Xenakis' point of view, as the aspects of the pitch collection are deployed, specific timbral qualities appear and textures can be completely different depending on the intervallic succession used[3]. This fusion of timbres, sonorities and intervallic structures impelled Xenakis to imagine that the musical application of the sieve theory succeeded, therefore creating an efficient tool to organize his musical ideas.

The inferences about the Byzantine and Greek scales were indirect, but the excerpt of the *pelog* scale was directly collected in Indonesia. As it will be presented in Chapter 7–Subchapter 7.1, this sequence of notes is the consequence of a gamelan ensemble recorded by the composer in the Northern Bali in December 1972. The use of such a direct reference was significant for Xenakis, as he used this approach integrating musical aspects of geographically-distant cultures by the mediation of mathematics to compose in his own visionary perspectives. By gathering divergent references such as those from Byzantine, Indonesian and Greek scales, Xenakis was achieving an idea that would conciliate his theoretical perspectives of the early 1960s with his actual practical achievements at the time.

### 6.1.2 Applying the sieve: melodic structures as waveforms, arborescences and clouds

Considering the aforementioned specific cross-cultural references found in the sieve, it is necessary to understand how the sieve was used by Xenakis and which attention he gave to the different intervallic successions present[4]. There is a constant flux from lower to higher returning to lower notes of the sieve constantly occurring with rare moments in which a specific intervallic period is stabilized and presented for a long period of time. Xenakis considered a fluid polyphonic texture that presents a restless movement of the voices throughout the range of the instruments as consequence of the constructed pitch collection. This signifies that what primarily occurs is that his sieve filters the pitches, while the directionality is determined by specific shapes and the density is coordinated by the rhythmic subdivisions (that are generally based on complex relations of mathematical proportions).

Xenakis' treatment of vertical and horizontal aspects resulted in melodic structures eminently presented as waveforms, but arborescences and clouds also occur. These established shapes are

[3] This is why, as mentioned on Chapter 5, he stated: "The structure of the melodic scale is very important, not only in melodic patterns–melodies–but also in producing chords of a different timbre. If you take a given range, and if the structure of the scale is rich enough, you can stay there without having to resort to melodic patterns–the interchange of the sounds themselves in a rather free rhythmic movement produces a melodic flow which is neither chords nor melodic patterns. That, perhaps, is what you mean. They give a kind of overall timbre in a particular domain." (Varga, 1996, p. 144).

[4] Here, the attention will be completely centered in «*Claviers*», but the specificities of its application in «*Mélanges*» will be later addressed (Subchapter 6.4).

recurrent and not only structure melodic aspects, but also characterizes different sections and textures, as well as the development of the overall material in time. As a result, during «*Claviers*», rare are the events that are not substantially presented with a certain visuality linked to a waveform. Xenakis' initial sketches of the movement (milestone 2) highlight that these melodic aspects are primarily a succession and superposition of visually and structurally waveform layers (Fig. 6.6).

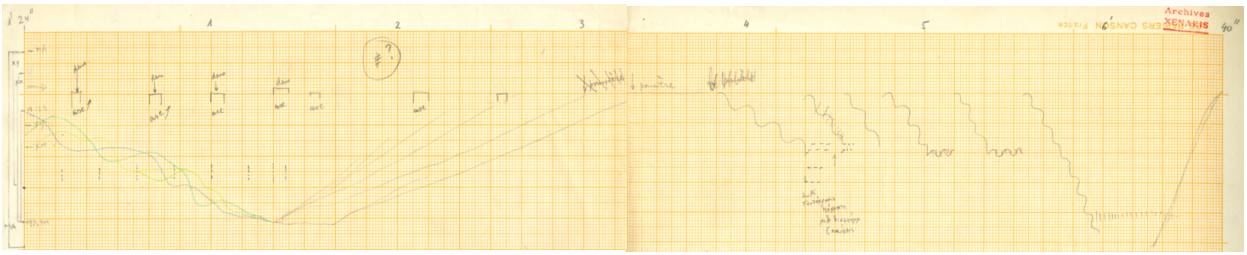


***Figure 6.6***. Presentation of melodic profiles treated with layout of waveforms in *Pléïades* manuscript. Source: © Famille I Xenakis DR (OM 28-17, p. 16).

The composer's decisions about melodic organization on the millimeter paper were inter alia guided by his research in electroacoustic music via additive frequency synthesis, as a constant overlapping of waveforms of different types, sizes and amplitudes (Fig. 6.7).

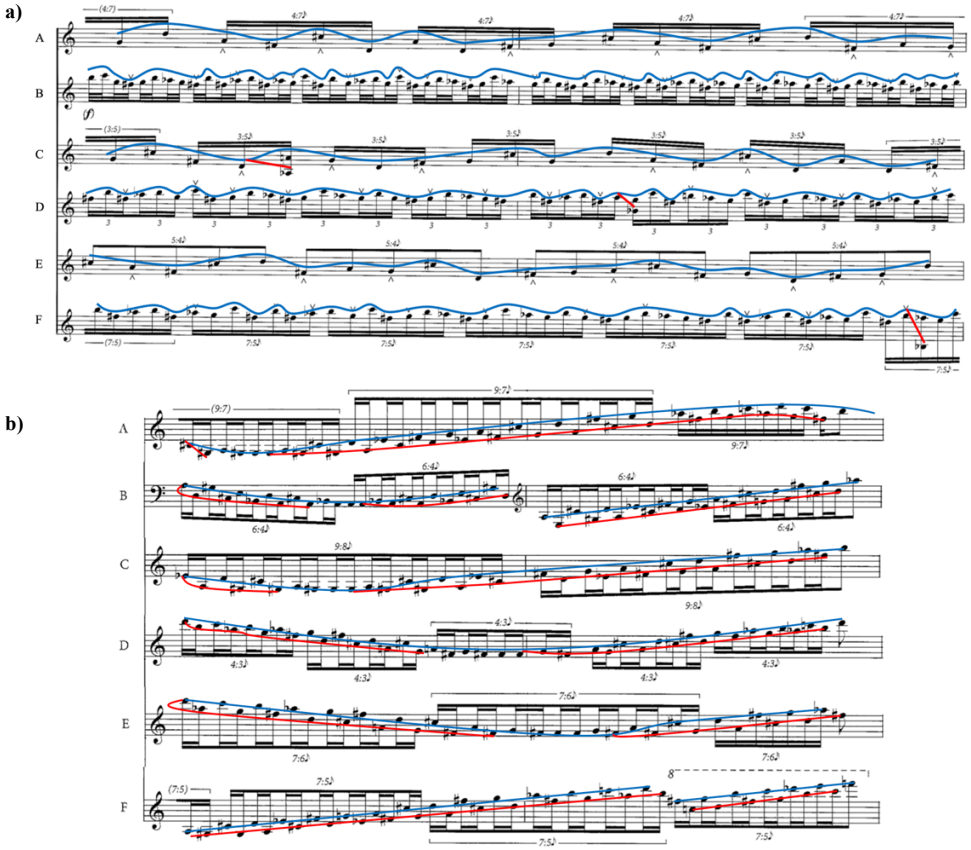
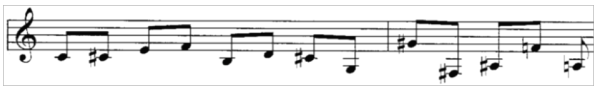
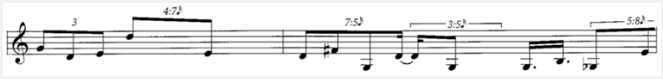
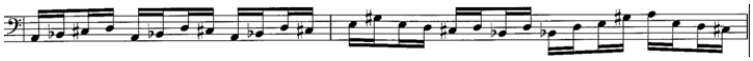
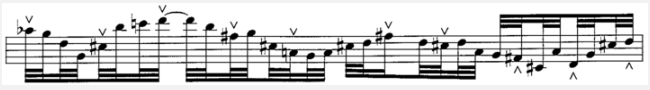
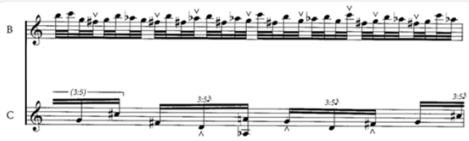
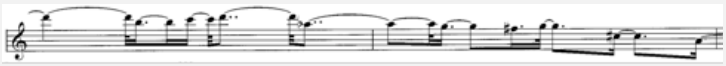
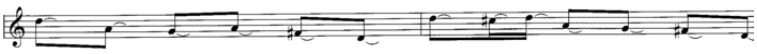
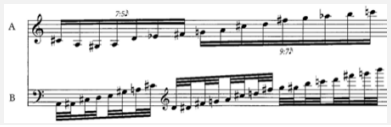
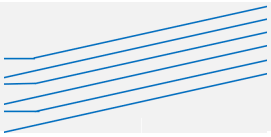
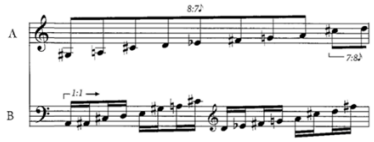
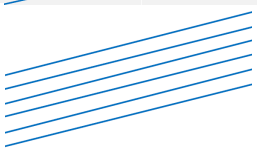
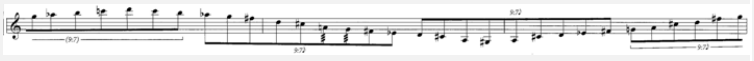
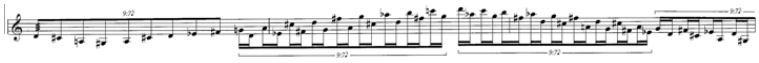
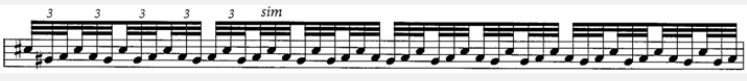



***Figure 6.7***. Layers of waveforms (in blue) with arborescent ramifications (in red) based on complex polyrhythmic ratios. The arborescent structures vary from rare (**a**) to very dense (**b**). **a)** Source: *Pléïades*, «*Claviers*», meas. 62-3 (Xenakis, 2013) – © Éd. Salabert. **b)** Source: *Pléïades*, «*Claviers*», meas. 108-9 (Xenakis, 2013) – © Éd. Salabert.

The instrumental results are evidently distinctive of the approaches with computer synthesis and transformation, but the way in which the composer cumulated layers of different undulatory characteristics is somewhat equivalent. These recurrences ultimately establish similar structures that share common aspects, and even create their own categories and subcategories. The development of this material also demonstrates the composer's search for a certain evolution and transformation of one waveform into another, connecting different structures in order to create a kind of pathway between the waveforms (a method that may also have particular connection with electroacoustic approaches).

The diversity of these melodic profiles, their characteristics and the potential correlation to a specific type of waveform or arborescence, as well as their potential development from one to another, guided a specific nomenclature as indicated below. The suggestions here developed to classify the materials, as seen on Table 6-1**,** are thus consequence of studies of Xenakis' manuscripts and the final score. The table below shows that the waveforms predominate, being primarily shapes of complex waves. The arborescence used by Xenakis is a consequence in the development of these undulatory shapes, of which is added to the waveform to increase the possibilities of variation and to complexify the final results. Even when extremely dense, the arborescence as a structure irradiates from a main melodic profile that has clear waveform shape (Fig. 6.7b), and its main purposes are the complexification and the variation of the structures.

***Table 6-1***. «*Claviers*»: recurrent melodic structures, their graphic representations (waveform in blue and arborescence in red) and the nomenclature here elaborated.

| Examples of melodic profile noted on score (Xenakis, 2013) | Graphic representation | Name |
|---|---|---|
|  |  | α1 |
|  |  | α2 |
|  |  | β1 |
|  |  | β2 |
|  |  | β3 |
|  |  | γ1 |
|  |  | γ2 |
|  |  | δ |
|  |  | $\delta^1$ |
|  |  | ε1 |
|  |  | ε2 |
|  |  | ω |

A synthetic description of the above melodic profiles classified is indicated on Table 6-2, pointing to range, rhythmic regularity or irregularity, and type of shape that has direct implications in its design and subsequent variations. This table also indicates in which measures these materials appear as well as the specific periods of the sieve where they are predominantly presented.

***Table 6-2***. Characterization of motive elements in «*Claviers*».

| Name | Meas. | Timbre | Summary characteristics | Period |
|---|---|---|---|---|
| α1 | 1-2 | m | first phrase in unison by vibraphones; the motive being a mixt of waveform (first half) and arborescence (second half)–rhythmically regular<br>maximum range: major ninth | not based on the sieve |
| $\alpha1^{I}$, $\alpha1^{II}$, $\alpha1^{III}$ | 2-7 | m | variations on α1 by irradiance of semitones; same notes occurring between $\alpha1^{I}$, $\alpha1^{II}$ and $\alpha1^{III}$ but different rhythms (sound halo)–rhythmically irregular<br>maximum range: major ninth | not based on the sieve |
| $\alpha1^{IV}$, $\alpha1^{V}$, $\alpha1^{VI}$ | 7-10 | m | different variations on the previous materials between ACE with waveform (1st half) and arborescent (2nd half) comportment–rhythmically irregular<br>maximum range: minor thirteenth | not based on the sieve |
| α2 | 10-16 | m | continuous variations with waveform (1st half) and arborescent (2nd half) comportment and progressive rarefaction of notes–rhythmically irregular<br>maximum range: minor thirteenth | not based on the sieve |
| β1 | 10-22 | w/m | ascendant complex wave profile (dense presence of notes) with successive entrance of wooden instruments (BFD) followed by vibraphones (ECA from meas.16)–rhythmically regular<br>maximum range: the whole sieve range in each instrument | P1 to P2 to P3 to P4 |
| β2 | 43-52 | m | stable complex wave presented in unison by the vibraphones–rhythmically irregular<br>maximum range: minor sixteenth | P2 and P3 |
| $\beta2^{I}$ | 45-52 | w | successive entrance of xylomarimba, marimba and xylophone with the same notes played by the vibraphones but with different rhythms (sound halo)–rhythmically irregular<br>maximum range: minor sixteenth | P2 and P3 |
| β3 | 61-65 | mw | stable complex wave being the metallic instruments in P2 and wooden ones in P3; permutations occurring between a common material between ACE as well as another between BDF–rhythmically regular<br>maximum range: each instrument presents its own limited one | P3 (BDF) P2 (ACE) |
| γ1 | 20-25, 26-31, 32-36, 37-41 | mw | descendent complex wave (rarefied presence of notes) generally having an impulsion by δ to the higher range–rhythmically irregular<br>maximum range: minor thirteenth | P4 to P3 to P2 to P1 |
| γ2 | 52-59 | m | stable complex wave with light descendent tendance–rhythmically irregular<br>maximum range: augmented eleventh | P1 to P4 |
| δ | 25, 32, 37, 42, 60, 66, 75, 83, 89, 93, 95, 97, 99, 103 | mw | a mixt of ascendant diagonal lines by wooden instruments and triangle waves by metallic ones; polyrhythms occurring during three quarters of a measure–rhythmically regular<br>maximum range: the whole sieve range in each instrument | P1 to P2 to P3 to P4 |
| $\delta^{I}$ | 109-110 | mw | variation of δ more than twice as large (duration of two complete measures)–rhythmically regular<br>maximum range: the whole sieve range in each instrument | P1 to P2 to P3 to P4 |
| ε1 | 67-97 | mw | stable sinusoidal wave interspersed by δ; from 86 some arborescences start to appear and it turn progressively more present–rhythmically regular<br>maximum range: the whole sieve range in each instrument | P1 to P2 to P3 to P4 and vice-versa |
| ε2 | 98-108 | mw | stable sinusoidal wave interspersed by δ with densification of arborescence; from 104 (last presentation of ε2) the arborescences are at the denser level–rhythmically regular<br>maximum range: the whole sieve range in each instrument | P1 to P2 to P3 to P4 and vice-versa |
| ω | 111-131 | mw | stable complex wave in unison–rhythmically regular<br>maximum range: augmented eleventh | sieve modified: P1 (octave higher) |

**Legend:**
m – metal timbre
w – wood timbre
mw – metal and wood timbre together
w/m – wood and metal timbre starting successively

In this table, it is evident that the melodic α profiles at the beginning of the movement have no connection with the pitch collection of the sieve. The final profile (ω) is a modification in the logical sequence of the sieve. At the same time, with the tables above confronted with the score, it is clear that Xenakis developed the variation idea inside each category and used contrasting melodic profiles to consistently vary textures, directions and ranges. He applied an interesting contrast of profiles, for instance, to dynamically change the constant descending tendency of the voices. In this case, the δ profile gave an impulse to other types of profile throughout the movement. This occurs repeatedly with phrases ascending to be counterbalanced by materials with downward tendencies (Fig. 6.8a and b). The contrast is occasionally reinforced by other aspects, such as the density of the materials and the rhythmic development. The maximum contrast of these differences can be perceived in the transition to Section C (Fig. 6.8c). The δ' profile is characteristically slower than the previous presented material and precedes the faster material of ω. In this passage, there are many contrasts created by δ' and ω profiles in terms of direction, type of shape, range, intervallic period of the sieve and dynamics.

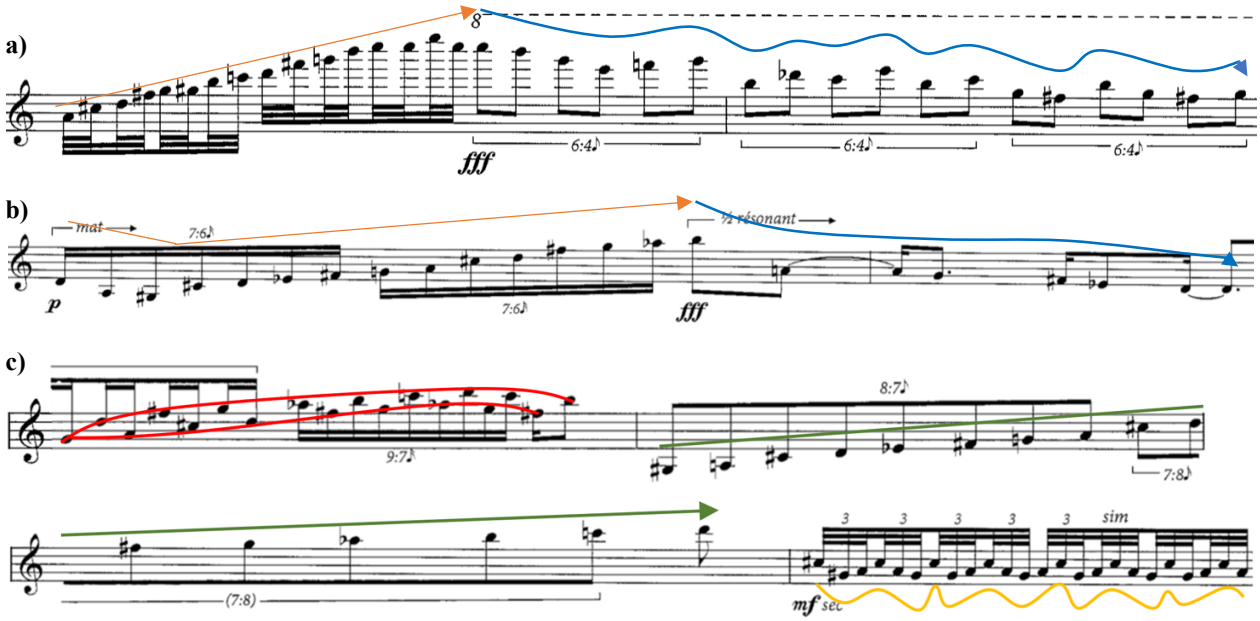



***Figure 6.8***. Interconnections of different profiles (part of δ in brown, γ1 in blue, ε2 in red, δ' in green, ω in yellow) and directionality as a driving factor. **a)** Source: *Pléïades*, «*Claviers*», meas. 26-27, player B (Xenakis, 2013) – © Éd. Salabert. **b)** Source: *Pléïades*, «*Claviers*», meas. 37-38, player E (Xenakis, 2013) – © Éd. Salabert. **c)** Source: *Pléïades*, «*Claviers*», meas. 108-111, player A (Xenakis, 2013) – © Éd. Salabert.

These examples depict how Xenakis showed strong interest in a correlation between the characteristics of the materials in terms of directionality. The composer treated this as a continuous interest during the elaboration of layers and waveform transformation, as if the entire movement embodied a broad complex sound developing its characteristics and possessing countless frequencies that establish themselves, and continually evolving in a constant transformation. The fact that an

exclusive pitch collection is used at the introduction (with α profiles) that is followed by the sieve characteristics (with β to ε profiles) and concluded with a variation of the same sieve (ω profile) reiterates this continuous transformation all over the movement.

### 6.1.3 Formal organization

It is this organization of the waveform materials that guided the classification of sections and subsections in «*Claviers*». Another element that also determined the subdivision is the distinctive application of timbres adopted when Xenakis grouped metallic instruments (three vibraphones) and wooden instruments (marimba, xylophone and xylomarimba) as cohesive subgroups (respectively emphasizing players ACE and BDF). The following Table 6-3 is based on these criteria.

***Table 6-3***. Classification and characterization of Sections, Subsections and Parts in «*Claviers*».

| Section | Subsection | Part | Meas. | Summary characteristics | Texture | Timbre | Players |
|---|---|---|---|---|---|---|---|
| A | A1 | $A1^{I}$ | 1-2 | first introductory thirteen notes phrase in eighth notes (α1) presented by the three vibraphones | MP | m | ACE |
| | | $A1^{II}$ | 2-7 | polyrhythmic variations on same pitch sequences derived from introductory phrase by three vibraphones ($\alpha1^{I}$, $\alpha1^{II}$ and $\alpha1^{III}$) | S.H. | m | ACE |
| | | $A1^{III}$ | 7-10 | rhythmic variations on distinct note sequences that maintain a semitonal relation with previous sequences of thirteen notes ($\alpha1^{IV}$ until $\alpha1^{VI}$ in each vibraphone) | S.H. | m | ACE |
| | A2 | $A2^{I}$ | 10-16 | wood timbres appearing successively in three polyrhythmic and denser layers of β1 material | W.F. | mw | ACE–BDF |
| | | $A2^{II}$ | 17-19 | increase in dynamics for all and in density of previous melodic materials for vibraphones | W.F. | mw | tutti |
| | | $A2^{III}$ | 20-25 | section's loudest dynamic with note rarefaction and vibraphone C presenting new descending motion (γ1) | W.F. | mw | tutti |
| | A3 | | 25-42 | fast direct ascending material (δ) and slower irregular descending scales (γ1), both being repeated three times and ending with a fourth δ material presentation | W.F. | mw | tutti |
| B | B1 | $B1^{I}$ | 43-45 | new melodic material presented in unison by vibraphones (β2) | MP | m | ACE |
| | | $B1^{II}$ | 45-52 | wood timbres appear successively with polyrhythmic variations on β2 | S.H. Arb. | mw | tutti |
| | B2 | | 52-59 | vibraphone C solo (γ 2) and wooden timbres intervention in unison | MP | m (w) | C (BDF) |
| | B3 | | 60-66 | fast ascending material (δ) and dense polyrhythmic scales with waveform (β3) | W.F. Arb. | mw | tutti |
| C | | | 66-110 | nine repetitions of δ interspersed with sinusoidal waves (ε1) in a stable polyrhythmic texture; material ε1 evolves to ε2 (denser with arborescences), concluding with $\delta^{I}$ | W.F. S.H. Arb. | mw | tutti |
| D | | | 111-131 | all voices present a fast and almost repetitive melodic line (ω) in 32nd triplets essentially characterized by three pitches and an occasional fourth one punctuating as a dissonance element | MP | mw | tutti |

**Legend:**
Arb. – arborescence
m – metal timbre
mw – metal and wood timbre together
m (w) – metal with wood interventions
MP – monophony
S.H. – sound halo
W.F. – superposition of waveforms

Fig. 6.9 has direct connections with the Table 6-3 and summarizes «*Claviers*» by highlighting the structural differences that ensure the cohesion of each section and the interweaving of the metallic and wooden materials. The black lines for each player indicate the melodic contours as developed by the composer. They highlight the clear visual reference of waveforms that the melodic profiles present throughout the movement. The image was produced proportionally with respect to the range and the directions in which they appear for each instrument, and they show how the sequence of notes chosen is directly linked to different types of wave phenomena superposed in six different layers. Because the indication by the player in this figure is related to the range of each instrument, vibraphones (subgroup ACE) and the marimba (player B) present the lower and higher notes with equal distances here but this does not occur in reality, due to the specificity of each one (in this case, vibraphone has a range from $F^3$ to $F^6$ and marimba from $A^2$ to $C^8$). What is being visualized is thus proportionally perceived in terms of the melodic development independent of the real limits of each specific range.

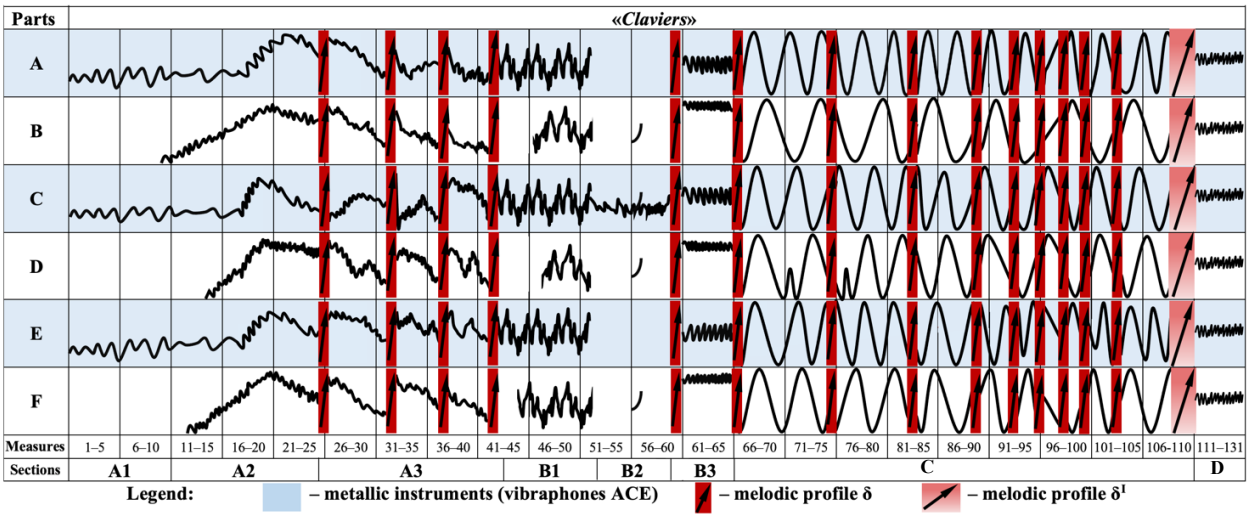



***Figure 6.9***. General layout of melodic aspects in «*Claviers*» pointing the range, directionality and types of waveforms.

The image above highlights an interesting perspective: the first melodic profiles in A1 (initially stable) and beginning of A2 are presented in the lower range with an ascendent tendency, but when they start to descend later (end of A2), they impel towards the high range and reinitiate the descending direction (A3). The fact that the movement begins in a low range is also reinforced by the entrance of the wooden instruments. The choice of sequence is based on their specific ranges, because the lower range marimba is the first to present the characteristic sieve (player B in meas. 10), followed by the intermediary xylomarimba (player F in meas. 12) and finally the highest range xylophone (player D in meas. 14). Section B begins in an intermediary range that remains stable for all instruments until the woods present a higher range (B3) and change to a section with all the ranges completely taken over (during C). The range is generally very homogeneous to all instruments, the

only exception to it is at B3 when ACE present melodic profiles in an intermediary range while BDF in a higher one. Independent of the instrument, the concluding Section D is developed on the middle range and is also stable because of the unison that characterizes the passage.

Fig. 6.9 shows how certain structural elements are interconnected, especially with respect to the recurrent use of the δ profile, and demonstrates the massive presence of the full sextet throughout the movement, with some exceptions for short sections with the vibraphone trio (in A1 and in B1) and the solo of player C with an intervention by BDF (in B2). In this perspective, the contrasting relationships between ACE and BDF (in sections A1, B1, B3 and beginning of C) creates two cohesive groups assembled by their own similar characteristics and range, developing a mutual dialogue that concludes with a fusional timbre by the expressive unison (in Section D). The emphasis of the subgroup ACE starts with the first phrase that opens the movement, attributed to the vibraphones. The context of α1 is noteworthy as an introductory melodic profile with undulatory and arborescent characteristics. As summarily stated by Barthel-Calvet (2000, p. 207):

> In the *Claviers* section of *Pléïades* (1978), the three vibraphones present from the beginning of the work the same melodic line deployed on an evolving polyrhythm [...]. The blurred effect induced by the micro-shifts and the phenomenon of melodic fusion are reinforced by the fact that they are instruments of identical timbre and moreover strongly resonant. If at first, the variation of the irrational duration groups allows to maintain this sound cohesion, Xenakis then lets the shifts progressively widen.[5]

Cohesion is an appropriate term to describe this movement, as it applies to the variety of instrument types, their internal timbral qualities and subgroups, the melodic correlation between different voices, the harmonic implications based on a unique sieve, the textures that aggregate different layers, and the treatment of sections and subsections. The Fig. 6.10 was elaborated to further perceive this cohesion constructed in the movement. This image reinforces previous commentaries and highlights how subgroup ACE and BDF have different aggregating factors besides timbre, such as unisons, sound halo and range homogeneity.

[5] "Dans la section *Claviers* de *Pléïades* (1978), les trois vibraphones présentent dès le début de l'œuvre une même ligne mélodique déployée sur une polymétrie évolutive [...]. L'effet de flou induit par les micro-décalages et le phénomène de fusion mélodique sont renforcés par le fait qu'il s'agisse d'instruments de timbre identique et de surcroît fortement résonant. Si dans un premier temps, la variation des groupes de durées irrationnelles permet de maintenir cette cohésion sonore, Xenakis laisse ensuite les décalages s'élargir progressivement." (Barthel-Calvet, 2000, p. 207).

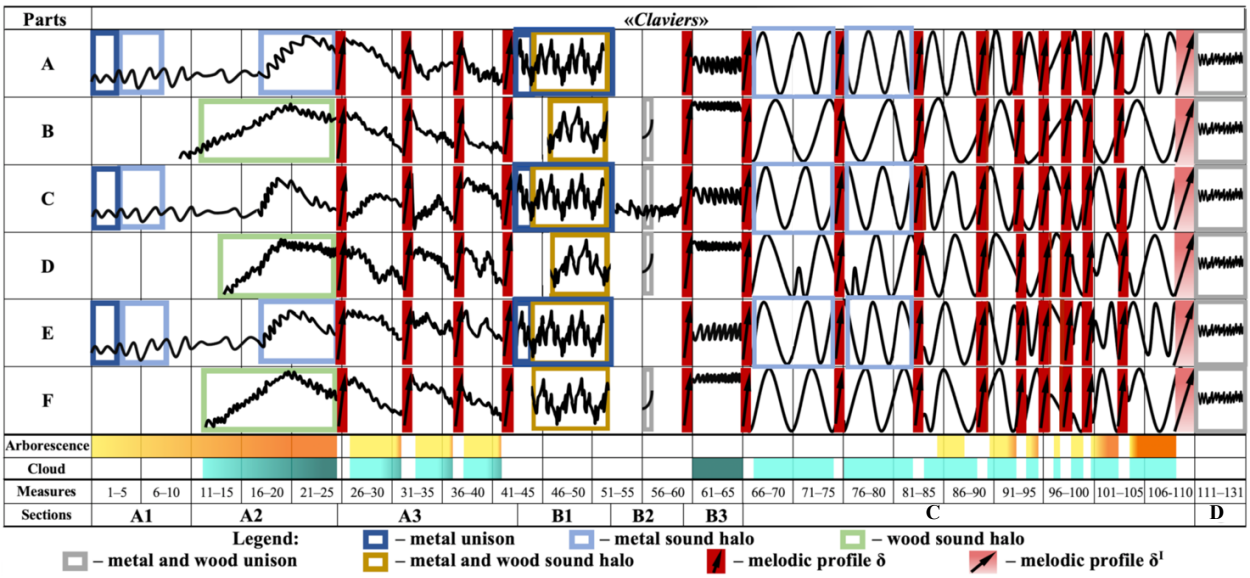



***Figure 6.10***. General layout of melodic aspects (range, directionality and types of waveforms) and textures in «*Claviers*» indicating the correlation between players in terms of homogeneous materials (by unison or sound halo).

Until Subsection B3, subgroups ACE and BDF are relatively separated, even with the sound halo texture between both in B1. The unison of the vibraphones in all of Section B1 is overlapped by the same material in sequential entrances of the wooden instruments (Fig. 6.11). The different rhythmic proportions that the composer developed generate the sound halo texture. The metallic instruments are steady and form a cohesive group, and the wooden gradually intensifies the sound halo (Fig. 6.11b).

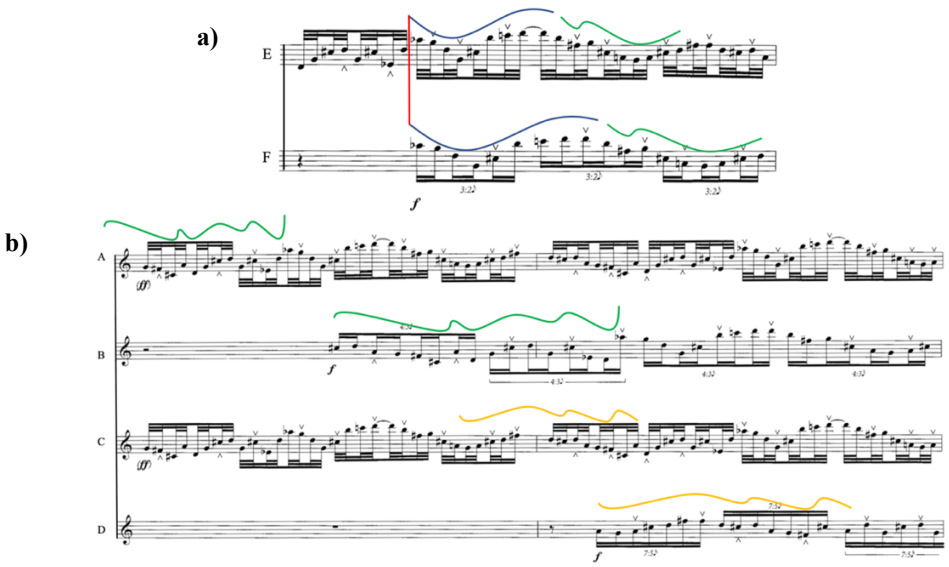



***Figure 6.11***. Sequence of wooden instruments simultaneous (**a**) and consecutive entries (**b**) producing sound halo with the vibraphones. **a)** Source: *Pléïades*, «*Claviers*», meas. 45 (Xenakis, 2013) – © Éd. Salabert. **b)** Source: *Pléïades*, «*Claviers*», meas. 46-7 (Xenakis, 2013) – © Éd. Salabert.

This passage of sound halo arrives at an extreme texture (Fig. 6.12). Even with the vibraphones marking a continuous unison with a strong dynamic (*ff*) in comparison to the wooden instruments (*f*), the superposition of the same melody lightly out of place creates an impressive heterogeneity.

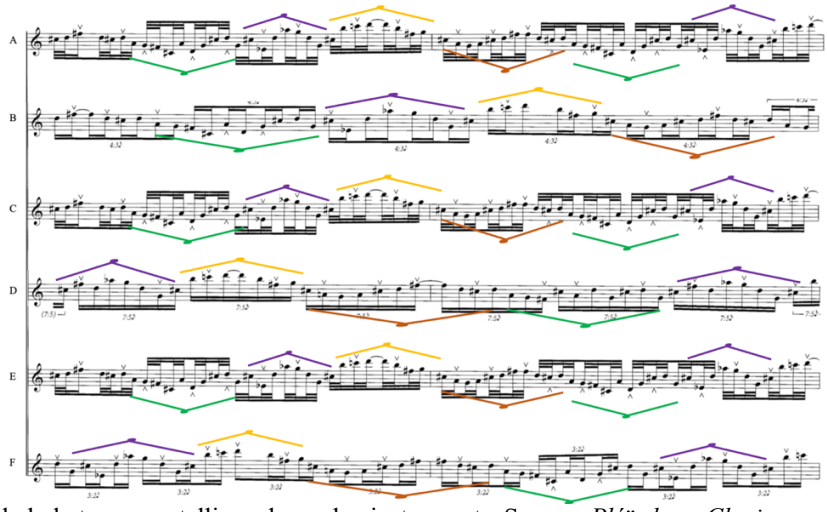


***Figure 6.12***. Sound halo between metallic and wooden instruments. Source: *Pléïades*, «*Claviers*», meas. 48-9 (Xenakis, 2013) – © Éd. Salabert.

Because of the superposition of different waveforms and the sound halo, clouds are manifestly present throughout movement, resulting from the complex polyrhythms that are characteristic of Xenakian approaches. These clouds may be denser (Fig. 6.13a) or sparser (Fig. 6.13b) depending on the number of notes per voice at any given time, of which are characterized by the developed polyrhythms. They may also be thicker or thinner depending on the vertical disposition of notes and the range required (Fig. 6.13c). This effect occurs several times throughout the movement, with numerous changes in the polyrhythmic correlations and the melodic range between the voices.

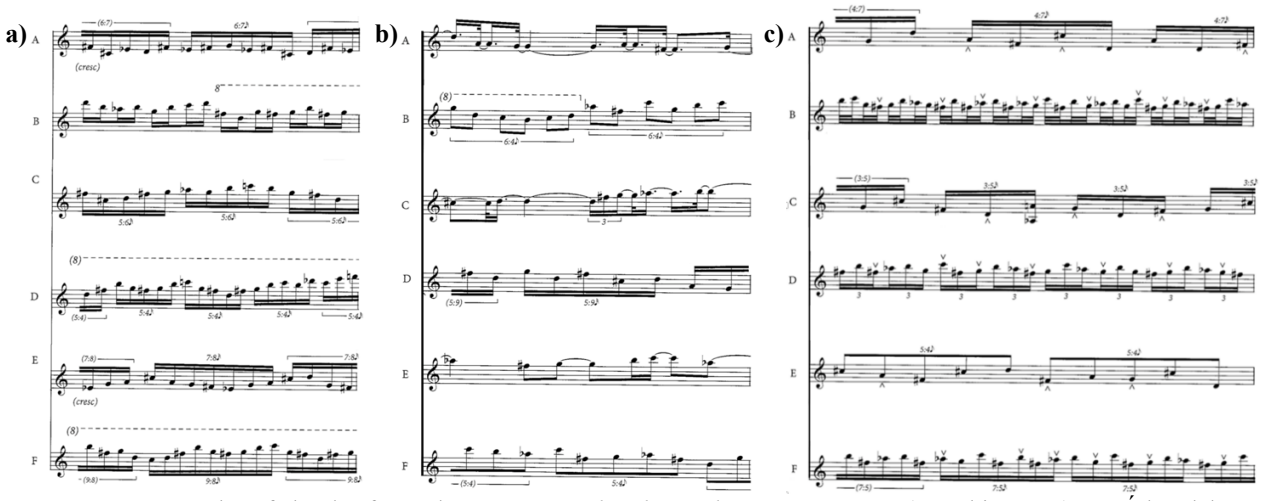


***Figure 6.13***. Examples of clouds of sounds. **a)** Source: *Pléïades*, «*Claviers*», meas. 18 (Xenakis, 2013) – © Éd. Salabert. **b)** Source: *Pléïades*, «*Claviers*», meas. 29 (Xenakis, 2013) – © Éd. Salabert. **c)** Source: *Pléïades*, «*Claviers*», meas. 62 (Xenakis, 2013) – © Éd. Salabert.

The undulatory phenomenon of overlapped waveform melodies is clear in this overview of the macrocompositional structures (Figs. 6.9 and 6.10). The more complex waveform types initially predominate (as in subsections A1, A2, A3, B1, B2, and B3, returning after in D) but Section C is typically characterized by sine waves, or moments when the range of the sieve for each instrument are completely fulfilled. The element δ1 splits these sinusoidal structures and has different implications depending on the subsection in which it appears. In A2, it promotes a range redirection of the descending structures, because downward-trending melodic contours are driven by this material to the highest range and resume the downward trend thereafter (see Fig. 6-10). In C, the element δ1 divides the profiles and promotes dynamism and variation within this stable section, while directionality of the melodic lines remains the same (Fig. 6.14). From meas. 66, there is a steady acceleration of appearance of the element δ which is followed by a deceleration (from meas. 98) for conclusion of the entire element δ' section that transitions to the beginning of Section D. In Section C, there is a relative aggregation of the timbres by a similar treatment of the undulatory profiles exposing the characteristic sieve interspersed by the δ profile until the total unison and timbre fusion that only happens in the next and conclusive section.

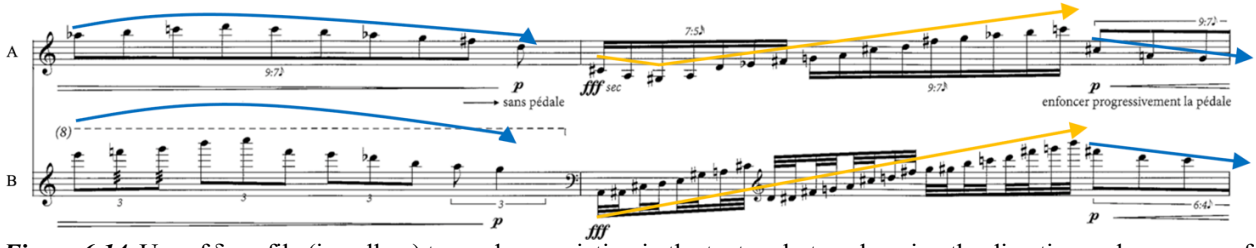



***Figure 6.14***. Use of δ profile (in yellow) to produce variation in the texture but unchanging the direction and sequence of the waveform ε2 (in blue). Source: *Pléïades*, «*Claviers*», meas. 74-75 (Xenakis, 2013) – © Éd. Salabert.

The dense concluding section D presents the only expressive unison that occurs between all metallic and wooden instruments. This specific section presents particularities and possesses a connection with a gamelan recording, being another moment in which Xenakis wished to submerge the public in a universe of sounds that connect with his references about Indonesian musical traditions. At this moment, there is a different use of the material present in the sieve, when the specific octave of the intervallic succession P1 changes. This means that pitches that would be characteristic of P1 are presented one octave higher where other notes should be the typical of the intervallic succession P2. In this harmonically differentiated section and because of the resulting homogeneous tutti, «*Claviers*» is concluded by a certain gathering of all the timbres by an expressive unison, in a kind of total fusion of the previously relatively independent materials.

Regarding this conclusion, Halbreich (1988, p. 247) wrote that "Claviers again recalls Bali, but this time for the choice of scales (the whole final part is in a kind of D major defective, without II and VI degrees, being actually a pentatonic mode, but with two semitones and two major thirds)."[6] Although the author is correct that this excerpt recalls Bali, he does not describe the real connection between both. In reality, there is a direct implication of Xenakis' experiences with gamelan music, as they are different than his interests only in the characteristics of the intervallic distances or a pitch collection that mimic the structure of an Indonesian scale. The composer was doing more than simply creating a new texture and breaking the normal disposition of the sieve with a sort of fusion of timbres; he was adopting a specific context, texture and collection of notes that he heard in a 1951 gamelan ensemble recording. This final section amasses a greater dimension in the imagery that the composer recreated, of which attests to direct connections with Indonesian materials and the intense use of outside references (see more details in Chapter 7–Subchapter 7.2). This movement represents the extreme development that melodic structures with waveform shapes underwent to be transformed in an Indonesian excerpt. Starting from his own music, calculations and approaches, Xenakis produced variations that conclude presenting an excerpt of a Balinese gamelan performance, a transfiguration or a variation present in his own piece of what he heard in 1951. His concepts about the universals in music and the dialogue that can occur between music from different cultures is here under full practical application.

## 6.2 «*Peaux*»

«*Peaux*» greatly contrasts with «*Claviers*», not only as the result of instrumental changes and timbral differences, but also because of the structural organization, the appearance of new textural and motivic elements, and the treatment of the materials. In this movement for drums, the composer emphasizes less the undulatory aspect of the structures and reinforces further certain precise rhythmic aspects, therefore creating numerous motivic elements that recur in the development of the movement. In contrast to «*Claviers*», where ACE and BDF formed two intertwined groups, the players are no longer forming two trios. Instead, they are grouped by different small formations throughout the development, by different duos, and by two trios that are here in stereophony (represented by ABC and DEF), with a clear predominance of sections in tutti.

[6] "Claviers richiama ancora Bali, ma questa volta per la scelta delle scale (tutta la parte finale è in una sorta di Re maggiore difettivo, senza II e VI grado: in realtà un modo pentatonico, ma con due semitoni e due terze maggiori)." (Halbreich, 1988, p. 247).

This movement presents a great homogeneity in the timbres and the use of same quality drums for all players with a small exception in A and F, and all setups have a very similar range. This timbral homogeneity between the six players also contrasts with «*Claviers*», where the percussionists have instruments of different timbres and equally-varied ranges. To reinforce these contrasts with the previous movement, the composer relied on new treatments appearing in «*Peaux*». The terms commetricity and contrametricity, of which are not addressed in the previous movement due to the continuous flux of notes and clouds of melodic characteristics, are crucial to understand «*Peaux*».

### 6.2.1 Timbres, instruments and initial materials

In «*Peaux*», Xenakis incorporated membranophones of different spectrums and various ranges, including bass drum, toms, congas, bongos and timpani. Among these instruments, only the timpani is harmonic with the possibility of producing defined frequencies, while the others are purely inharmonic. The players have similar setups (one timpano, three toms, one conga and two bongos) but A and F have each an additional bass drum. Consulting Xenakis' manuscripts, he may have wanted the same setup for all players as he even wrote a tab in which all the instrumentalists would have a bass drum (Fig. 6.15a). The composer was limited by the instruments available to Les Percussions de Strasbourg at the time, as also noted by specific manuscripts and a list sent by the French ensemble). The percussion group had to acquire new bongos, congas and toms for the premiere of *Pléïades* (Fig. 6.15b). They did not acquire new bass drums, leaving to Xenakis the availability of only the two they already had in their collection. If the indication of instrumentation in Fig. 6.15a is correct, it could indicate that the composer had preferred another complete set-up for this movement[7].

**a)** **b)**


***Figure 6.15***. Iannis Xenakis' manuscripts about the instrumentation in «*Peaux*». **a)** Indication of the same drums for all six players. Source: © Famille I Xenakis DR (OM 28-17, p. 16). **b)** Indication of the drums already owned by Les Percussions de Strasbourg and those that should be acquired in order to perform *Pléïades*. Source: © Famille I Xenakis DR (OM 28-17, p. 15).

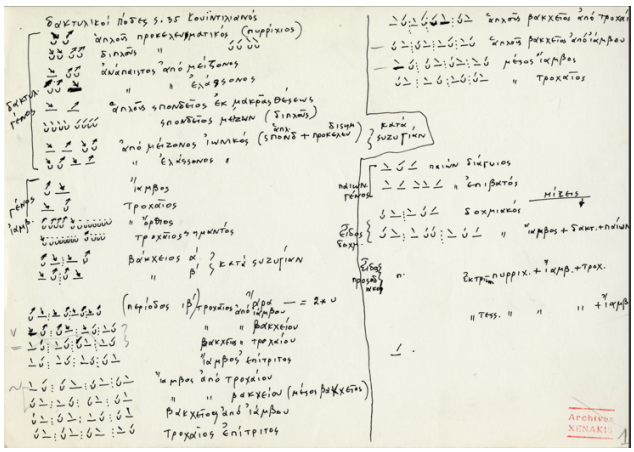
[7] The use of six bass drums during this movement is the choice of Les Percussions de Strasbourg, being even recorded in their last album (2022) with the complete piece (see more details in Chapter 11–Subchapter 11.3).

Xenakis (1979, p. i) gave an overview of «*Peaux*» in the introduction. As highlighted there:

> *Pléïades*, "pluralities", "several", because six percussionists, four sequences. The rhythm is essential, that is to say the temporal order of the events, the combination of durations, intensities, timbres. It is built on several parallel fields but with transverse circulations, that is to say that figures are simultaneously deformed or not. Some of the fields are realized by accents which superimpose rhythms to those of the normal strokes. The timbres of the skins are also functional, subject to specific rhythmic fields.[8]

The material that Xenakis initially organized for this movement demonstrates a diametrically opposite direction with «*Claviers*». The difference between the predominance of arrhythmicity (in «*Claviers*») and metricity (in «*Peaux*») is notorious. While the textures for percussion keyboards are notably based on clouds of sounds with melodic profiles inspired on waveform shapes complexified by arborescences, he organized for the drums material eminently rhythmic and based on Greek poetic metrics. Among his initial manuscripts (milestone 1), one can notice a scheme specifically developed from this type of metric (Fig. 6.16). Xenakis then gathered different types of structures that could serve as a basis to follow patterns derived from the notion of short (U) and long (__) durations. It is based on these materials that some terms from the Greek metrics will be used to name and classify specific motifs that appear throughout movement. Certain materials that appear in this first scheme of Xenakis and that will be recurrent during «*Peaux*»'s development stand out: the anapest and dactyl motives (Fig. 6.16b).

**a)**



**b)**

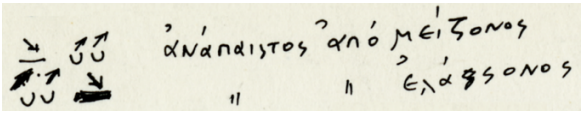



***Figure 6.16***. Initial organization of metrical material from Greek poetic forms. **a)** Complete page with rhythmic guidelines. Source: © Famille I Xenakis DR (OM 28-17, p. 1). **b)** Details of specific elements that will be regularly used during the «*Peaux*» movement.

[8] "*Pléïades*, « pluralités », « plusieurs », car six percussionnistes, quatre séquences. Le rythme y est primordial, c'est-à-dire l'ordonnance temporelle des événements, la combinatoire des durées, des intensités, des timbres. Il est bâti sur plusieurs champs parallèles mais avec des circulations transverses, c'est à dire que des figures sont simultanément déformées ou pas. Certains des champs sont réalisés par des accents qui superposent des rythmes à ceux des coups normaux. Les timbres des peaux sont aussi fonctionnels, assujétis à des champs rythmiques spécifiques." (Xenakis, 1979, p. i).

When considering the context of the work, one can see that these rhythmic motifs serve as the basis for numerous phrases presented throughout the movement with some variations. For example, the anapest and dactyl motives recurrently appear and have a fundamental importance in the variability of the phrases within the rhythmic profiles composed (see Fig. 6.17).

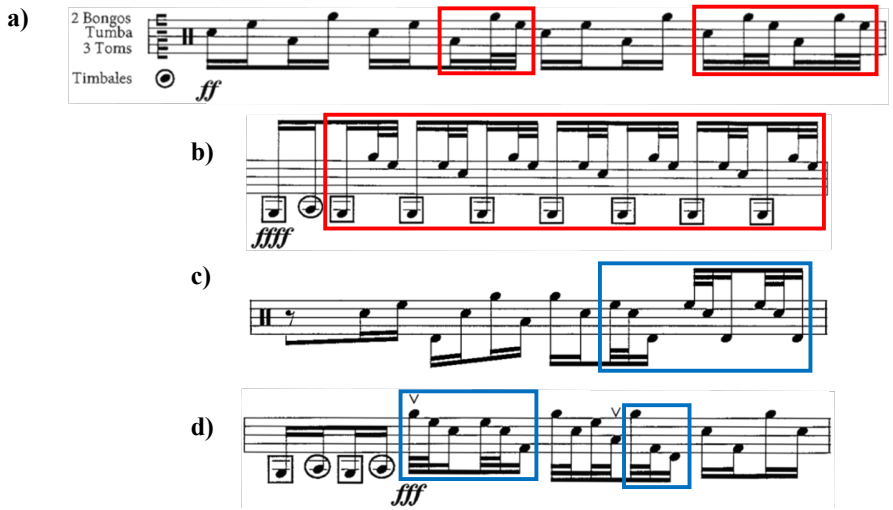



***Figure 6.17***. Excerpts from *Pléïades* with dactyl (**a** and **b**) and anapest (**c** and **d**) motifs, in red and blue respectively. **a)** Source: *Pléïades*, «*Peaux*», meas. 1, player D (Xenakis, 2013) – © Éd. Salabert. **b)** Source: *Pléïades*, «*Peaux*», meas. 73, player A (Xenakis, 2013) – © Éd. Salabert. **c)** Source: *Pléïades*, «*Peaux*», meas. 9, player B (Xenakis, 2013) – © Éd. Salabert. **d)** Source: *Pléïades*, «*Peaux*», meas. 78, player A (Xenakis, 2013) – © Éd. Salabert.

In a 1989 interview, Xenakis gave a precise description on what to consider when analyzing his music in terms of rhythmic elaboration. When asked why particular rhythms and patterns had become simple and metrical in his then-recent production, he answered:

> The reasons are threefold. First of all I come from a place where these rhythms – and I'm happy to call them Bartókian rhythms – are indigenous. They are traditional in Greece, not so much in Romania, and also in Bulgaria. I was brought Up on them.
> I have studied and been attracted by Indian rhythms: based on very simple elements, they are highly complex. You take one pattern – say: 2-3-3; then you expand it by moving the beat (the down-beat, for instance) just one unit, and then go back to the original pattern. This creates a discrepancy in your mind. We're very sensitive to equal rhythm: it's like the movement of a train. If you shift it by just one unit you're shaken out of it. This is very important from both an aesthetic and a psychological point of view. I studied Indian percussion music a long time ago – not to imitate it but to understand the underlying principle, these shifts of rhythm which produce a multi-layered system even on a single instrument. In *Psappha*, for instance, the accents produce several layers of rhythmic patterns, superimposed one on another, all with just one performer. Of course, it's quite a challenge for the percussionist.
> Thirdly, I've also studied African rhythms, which also appear to be complex but in fact are based on isochronic rhythmic patterns. Again, they're very close to my axiomatics of complex pitch or rhythm structure, based on a pattern which repeats several moduli simultaneously. It's this structure that serves as a tool to produce polyrhythms. (Varga, 1996, pp. 146-147).

The second element of changing rhythmic patterns in the variations in «*Peaux*» will be addressed below.

### 6.2.2 Rhythmic development based on numerical variations

In addition to the motivic elements classified according to the Greek poetic metric denomination and based on Xenakis' statement about rhythmic composition, it is thus important to consider how he developed certain materials and worked on both expansion and compression of rhythmic patterns in the movement.

The composer used the distance between certain elements in terms of numbers, quantifying the space between structures that would then represent certain types of rhythmic figures and attack disposition (such as 16th or 32nd notes). The material that would characterize the first duet (with players E and F) from meas. 10 to 33 (Subsection A1) is initially stable and presents some recurrence in terms of distance (Fig. 6.18a). In this excerpt, players E and F have a certain regularity in phrases of fourteen 32nd notes, but both are displaced from each other. Moreover, each has different internal subdivisions, with player F presenting distances of five and nine 32nd notes between the low and the high drums. Thus, because of these differences in relation to the regular 4/4 metric in which these structures are written, this passage presents a clear contrametricity. Another example can be seen in section B1 where the high line of bongos is characterized by an ostinato in 4 4 6 (32nd notes) of distance between the accents. This rhythmic phrase 4 4 6 is even maintained during the changes of the bongo line from one player to another (Fig. 6.18b).

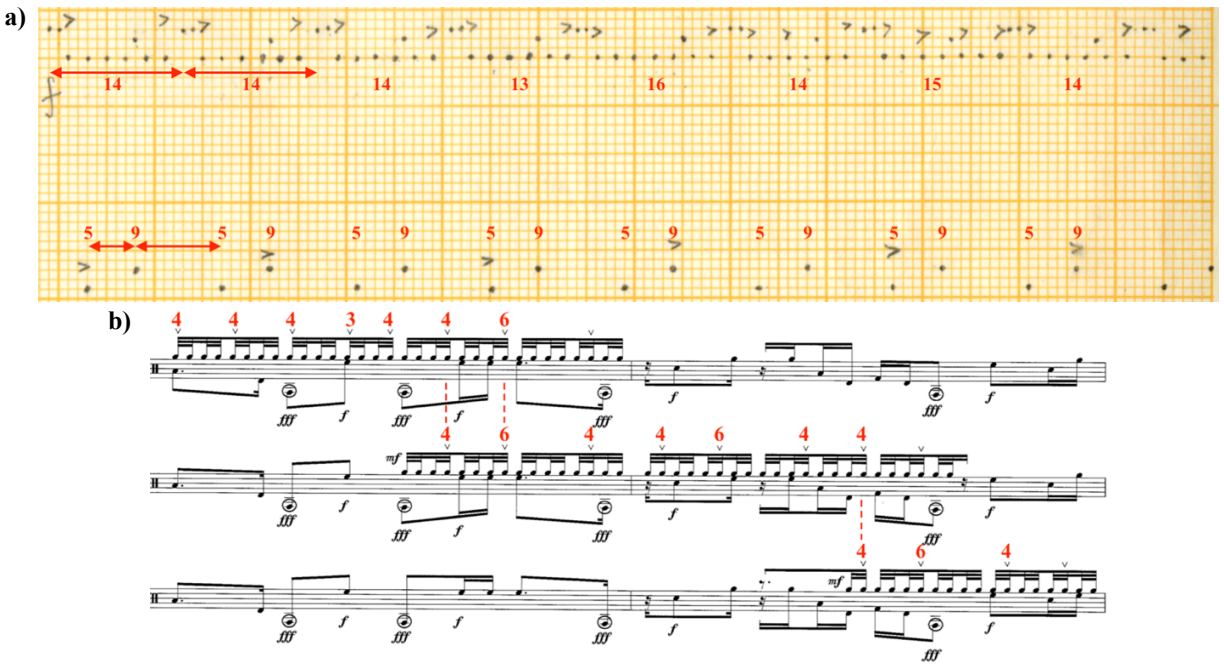



***Figure 6.18***. Use of distances measured by 32nd notes between rhythmic elements. **a)** Excerpt from «*Peaux*» (meas. 9-13, players E and F) showing the distances between 32nd notes (added in red) in the manuscript. Source: © Famille I Xenakis DR (OM 28-17, p. 17). **b)** Excerpt from «*Peaux*» showing the distances between 32nd notes (in red) added to the score. Source: *Pléïades*, «*Peaux*», meas. 52-53, players B, C and D (Xenakis, 2013) – © Éd. Salabert.

Because *Pléïades* is Xenakis' profound studies on plurality and multiplicity, the composer presented enormous changes and variation in the distance of the rhythmic elements. This allows a perception of materials that are equal but constantly varied through microvariations. Even if quite micro, these variations greatly impact the result of the rhythmic patterns and grooves. The composer would even write "expand contract the sounds [and] rhythms everywhere" ("*dilater contracter les sons rythmes partout*"–Fig. 6.19a) as a reminder to constantly change the structures by the means of numerical elements and proportions based on whole numbers. In this perspective, the Fig. 6.19 indicates variations made based on the patterns previously presented in Fig. 6.18. The pattern of 14 32nd notes initially presented (Fig. 6.18a) is constantly altered by expansion and compression by both players (Fig. 6.19a). In the second example, the pattern 4 4 6 with 32nd notes is changed to 3 5 and, with this not only new rhythms appear but also the organization based on the notion of contrametricity change to a certain commetricity (Fig. 6.19b).

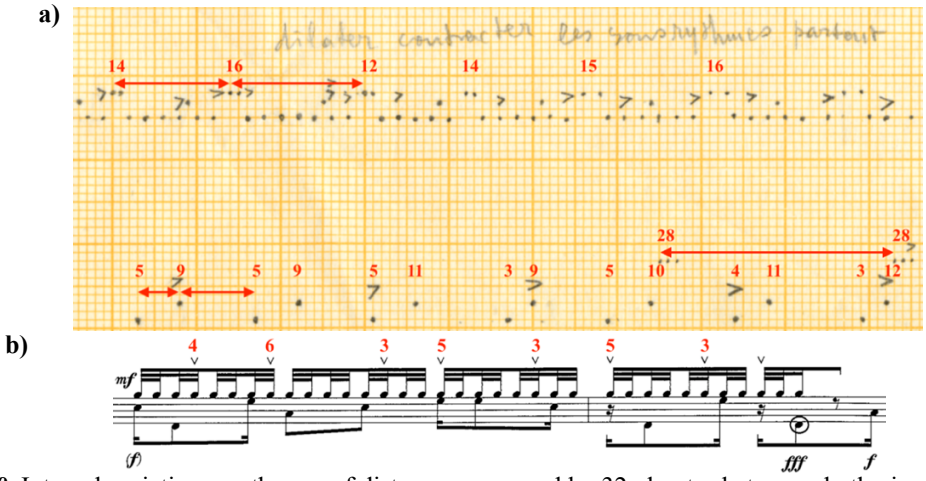



***Figure 6.19***. Internal variations on the use of distances measured by 32nd notes between rhythmic elements. **a)** Excerpt from «*Peaux*» (meas. 14-17, players E and F) showing the distances between 32nd notes (added in red) in the manuscript. Source: © Famille I Xenakis DR (OM 28-17, p. 17). **b)** Excerpt from «*Peaux*» showing the distances between 32nd notes (in red) added to the score. Source: *Pléïades*, «*Peaux*», meas. 54-55, players E (Xenakis, 2013) – © Éd. Salabert.

These variations either expand the materials, distancing them apart, or compress the emplacement of the attacks, bringing them closer. It is with this constant development of proportions in several layers simultaneously that Xenakis elaborated and built the rhythmic relationship between different players in duos, trios or tutti, or between the instruments of the same musician.

### 6.2.3 Formal organization

The instrumentation, textures and development of specific motivic elements were taken into consideration to characterize the division of sections and subsections in «*Peaux*». Thus, Table 6-4

summarizes the sections and their specific subdivisions, as well as the main characteristics and development during the movement.

***Table 6-4***. Classification and characterization of Sections, Subsections and Parts in «*Peaux*».

| Section | Subsection | Part | Meas. | Summary characteristics | Texture | Timbres | Players |
|---|---|---|---|---|---|---|---|
| A | A1 | | 1-9 | conducting line with medium and high drums (toms, congas and bongos) in D cut by individual and tutti interventions (total metricity until B3) | S.I. | medium and high drums | D (ABCEF) |
| | A2 | | 10-33 | first duo (E and F) with interventions, sporadic apparition of lower drums (timpani and bass drum) | D.I. | medium and high drums | EF (ABCD) |
| | A3 | | 33-48 | shorter second duo (A and C) with progressive entrances of B, D, E and F that densify the texture, stabilizes the sextet and exposes a constant use of lower drums | duo/ sextet | all drums | AC (BDEF) |
| B | B1 | $B1^{I}$ | 49-61 | new rhythmic material emphasizing the extreme of drums tessiture and passages of bongos rhythmic and accentuate high line by all musicians | H.T. | all drums | tutti |
| | | $B1^{II}$ | 61-67 | return of the same anterior structure with different materials in a smaller passage and liquidation at the end of the part | H.T. | all drums | tutti |
| | | $B1^{III}$ | 67-80 | D solo and a sequence of tutti in unison in a stable rhythmic passage that marks the loudest excerpt in A and B sections | solo/ unison | all drums | D, tutti |
| | B2 | | 81-94 | successive duos (B–D, C–F and A–B) with interventions (C, D, E and F) as a liquidation of previous materials and presentation of new ones, transitioning to a new section | duos | all drums | B–D<br>C–F<br>A–B |
| | B3 | $B3^{I}$ | 94-108 | tutti development separated by two groups of three musicians in a *moto perpetuo* of polyrhythmic layers with all drums besides bass drums (progressive development of arrhythmicity) | clouds | all drums | ABC–DEF |
| | | $B3^{II}$ | 109-122 | six individual polyrhythmic lines punctuated by extreme attacks with lower drums and liquidation of materials by rarefaction (total arrhythmicity) | clouds | all drums | tutti |
| C | | $C^{I}$ | 122-134 | roll on lower drums in a fluid texture with crescendo and decrescendo alternating in successive voices | glissandi | all drums | tutti |
| | | $C^{II}$ | 135-142 | descending unison rolls with all drums besides bass drums | unison glissandi | all drums | tutti |
| | | $C^{III}$ | 142-147 | steady *ffff* attacks on conga with constant decrescendo to *ppp* until the end (total metricity) | unison | all drums | tutti |

**Legend:**
D.I. – duo with interventions H.T. – high timbre S.I. – solo with interventions

This table shows that the main development of the movement is essentially concentrated in the intermediary Section B, of which has the most material and diversifies the effect of sound clouds in the movement. While Section A is clearly a sort of development of solos and duos with interventions of other musicians, Section B gathers the sextet in tutti sections with several unison passages. Tutti sections are also characteristically how Xenakis organized the last Section C. This sort of continuous passage from individualities to a broader collectivity in terms of treatments reflect the process that

occurs in this movement, ending with the final unison of all percussionists in the same sonority and rhythm.

With this broad overview of the movement, it is important now to signify what «*Peaux*» presents in terms of newer structural materials compared to the previous movement. It will be clear that this is not strictly attached to the change of instrumentation, but rather is what penetrates the pillars of the macrocomposition.

### 6.2.4 New structural elements

When compared to «*Claviers*», there are clear differences in «*Peaux*», with almost no connection between both movements and some elaborated materials. While «*Claviers*» is more based on arrhythmicity and a kind of constant fluidity developed by the *moto perpetuo* of melodic lines, «*Peaux*» is essentially pure metricity, reserving the conclusive sections to expose some arrhythmic passages (producing some intense shapes of clouds from meas. 109). In this perspective, «*Claviers*» is almost entirely based on melodic aspects based on waveform and arborescent shapes with heterophonic textures based on sound halo and clouds of sounds, while «*Peaux*» has no basis on the wave phenomenon or sound halo[9].

As new materials, a motif with two alternated notes is recurrent throughout «*Peaux*» and is used in different voices and in tutti sections. This motif is presented during the introduction (Section A1), in part of the conducting solo by player D (Fig. 6.20a), and will reappear numerous times throughout the development of different sections (Fig. 6.20). This material never appeared in «*Claviers*» but will be featured in «*Métaux*», as will be shown and discussed later.

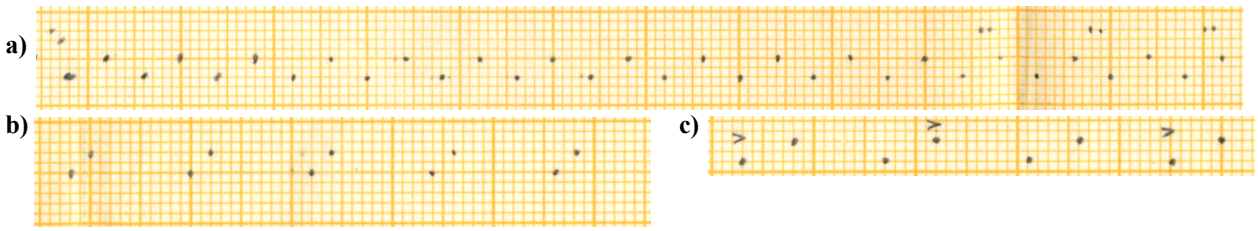



***Figure 6.20***. New material recurrently presented in «*Peaux*». **a)** Excerpt from «*Peaux*» – meas. 4-7, player D. Source: © Famille I Xenakis DR (OM 28-17, p. 17). **b)** Excerpt from «*Peaux*» – meas. 7-8, player B. Source: © Famille I Xenakis DR (OM 28-17, p. 17). **c)** Excerpt from «*Peaux*» – meas. 9-11, player F. Source: © Famille I Xenakis DR (OM 28-17, p. 17).

At the end of the movement, another element appears: the glissando. While in «*Claviers*» the pitches are limited by the specific sieve, excluding any possibility of wide-range glissandi (including discrete or chromatic glissandi), this effect is possible in «*Peaux*» due to the use of the timpani. Thus,

[9] And there is potentially a correlation with the first steps of the creative process and the sketches that Xenakis produced on millimeter paper because, while «*Claviers*» presents the milestone 2 with a much more graphic notation based on waveforms, «*Peaux*» was predominantly developed with a pointillist notation.

a specific texture of rolls with continuous glissandi by the timpani in ascendent and descendent contours is developed from meas. 122 (Fig. 6.21).

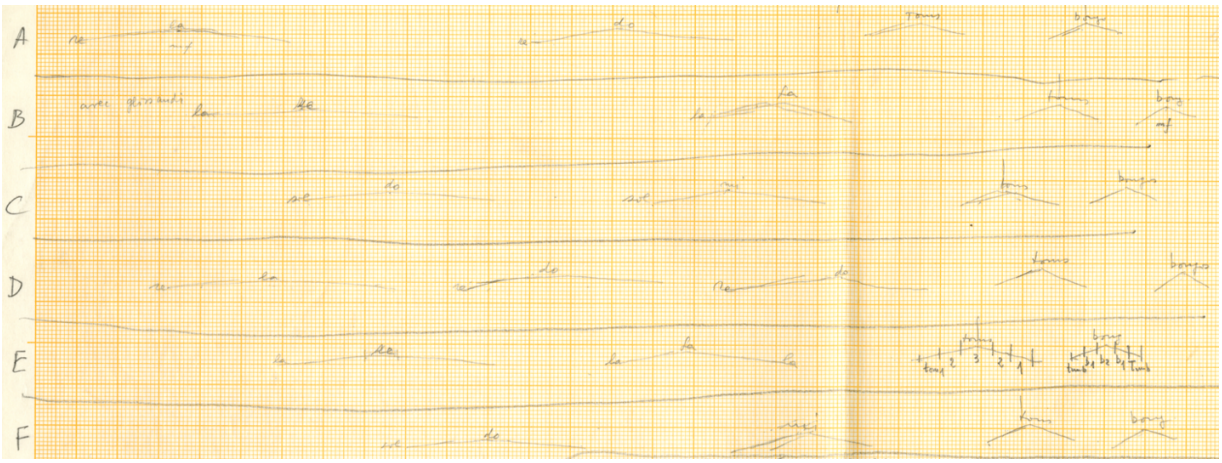
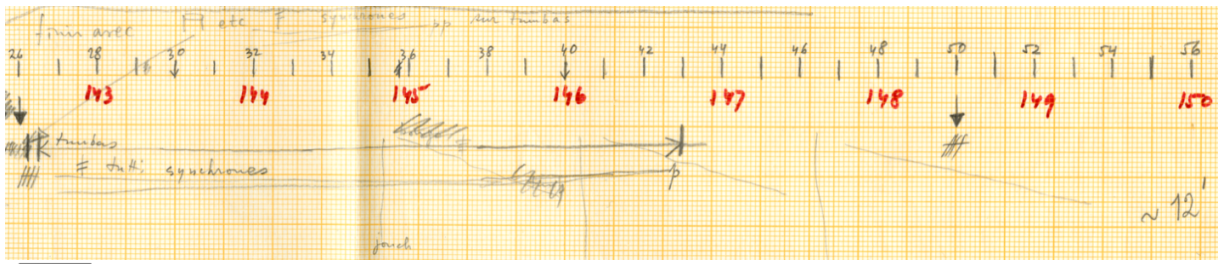



***Figure 6.21***. Presence of glissandi at the concluding section of «*Peaux*». Source: © Famille I Xenakis DR (OM 28-17, p. 21).

«*Peaux*» may have had a different coda than what Xenakis presented. It is noticeable in the composer's manuscripts that there are more measures (150) than in the definitive version (147), and that he made a reference about *Jonchaies* on meas. 145 (Fig. 6.22a). From this point, he would imagine descending movements between the high and the low drums, indicated by diagonal lines as previously made from meas. 135 and that could possibly indicate the same material, and changes in dynamics generally presented by indications of fortissimo. This potential ending was completely disregarded and these diagonal lines and loud dynamic changes were not used in the final transcription of the score during the milestone 4 (Fig. 6.22b). On the contrary, the result featured a completely stable line in only the conga and with a constant decrescendo.

**a)**




**b)**

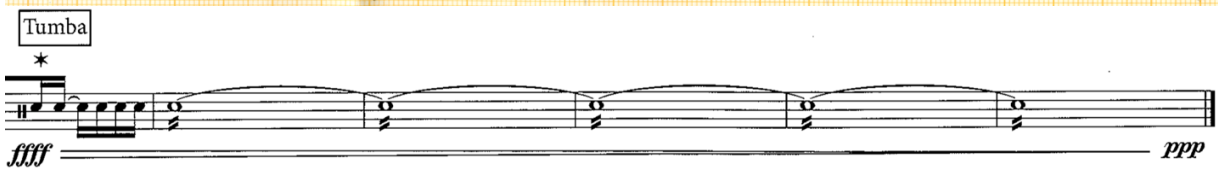



***Figure 6.22***. Differences between the end of the Coda composed in the manuscript and transcribed in the final score. **a)** Initial sketch with indications of instrument changes from higher to lower pitches and dynamics changes (meas. 142-150). Source: © Famille I Xenakis DR (OM 28-17, p. 21). **b)** Final score without the treatments indicated above and with fewer measures. Source: *Pléïades*, «*Peaux*», meas. 142-147, tutti (Xenakis, 2013) – © Éd. Salabert.

The composer preferred the change to maybe present some sonic connection with the beginning of «*Métaux*», that starts with all musicians playing a same note. However, because there are fundamental timbral differences, this connection would only be suggestive. The definitive conclusion of Section C elaborated in «*Peaux*» has also some correlations with the end of «*Métaux*», as both were changed during the milestone 4, and resulted in a constant decrescendo of repeated notes. «*Métaux*» will be addressed to elucidate more connections with the previous movements.

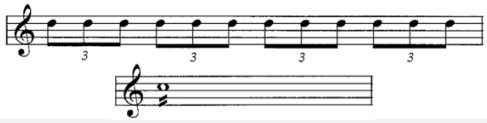
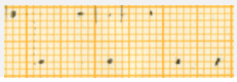
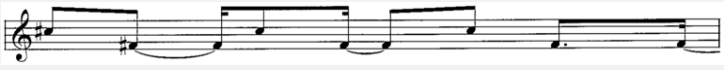
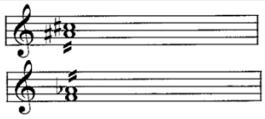
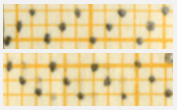
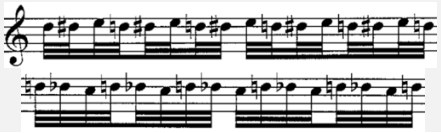
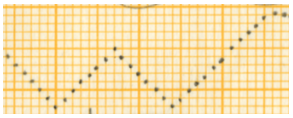
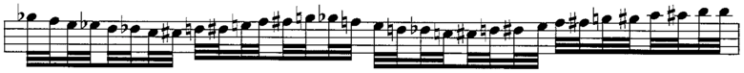
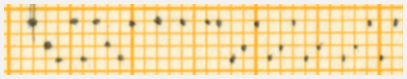
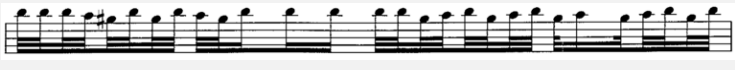
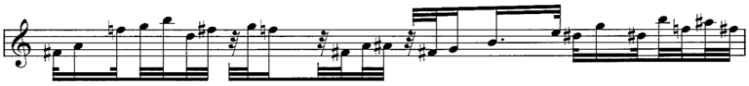
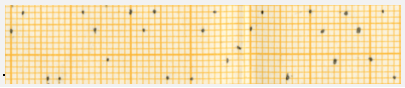
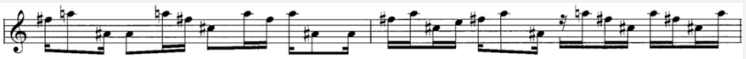
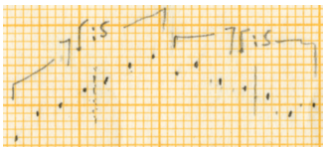
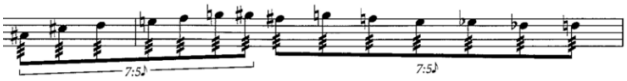
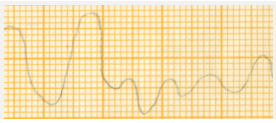
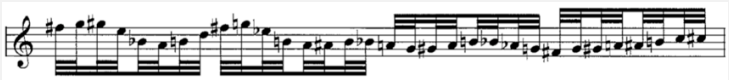
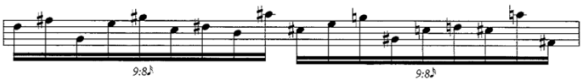
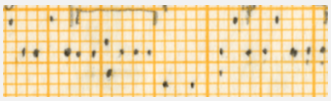
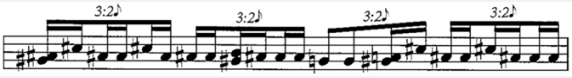
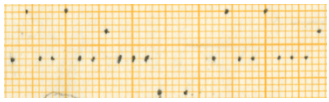
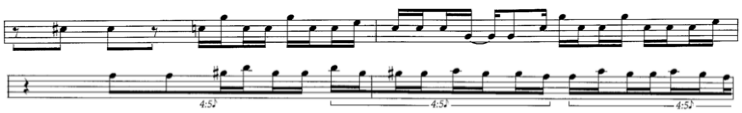
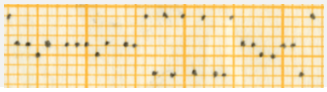
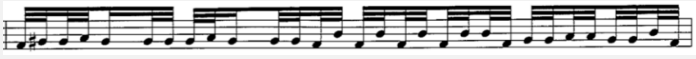
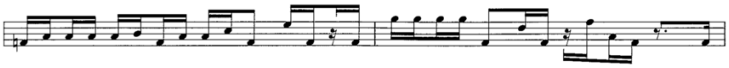
## 6.3 «*Métaux*»

In «*Métaux*», Xenakis developed unique aspects, of which some are new and others presenting clear connections with the previous monotimbral movements. Being the essential part for SIX-XEN, the first to which the instrument would be even conceived, it is crucial here to present its characteristics in detail with a meticulous comparison with the previous sequences in terms of textures, treatments and passages. In this way, as in «*Claviers*», Xenakis adopted waveform profiles in numerous passages and, as in «*Peaux*», he used anapest and dactyl structures as essential rhythmic motives as well as the techniques of pattern compression and expansion based on numbers. The movement was also developed presenting sound halo heterophonic textures as «*Claviers*» but pointillistic and glissandi textures that could be correlate to «*Peaux*». This could point to new aspects of Xenakis' concepts about his instrument in how he initially applied it in a practical perspective.

### 6.3.1 Motives and melodic profiles

«*Métaux*» presents not only a completely new timbre and percussion arsenal to the piece, but also new motivic materials as well as specific melodic profiles. These elements are presented in parallel with the waveform profiles as in «*Claviers*» and the rhythmic structures as in «*Peaux*». In «*Métaux*», these profiles characterize a continuous development all throughout movement. Thus, as a consequence of internal variations, novelty arises by derivation from previous materials, signifying why they manifest numerous subdivisions of a same category. During milestone 2, the composer thus worked with a wide range of melodic profiles and shapes to characterize the structures, depicting the importance of showing the origins of these materials in the millimeter paper and how these were highlighted in the final score, as pointed in Table 6-5. Only after this direct correlation between the initial drawings and their transcription will the specificities and the characterization will be better addressed.

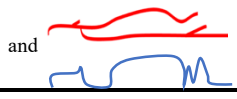
***Table 6-5***. Visual comparison between melodic profiles composed on millimeter paper and the result of the transcription classified according to the type of motive and order of appearance in «*Métaux*».

| Name | Graphic representation made by Xenakis | Examples as noted on the score (Xenakis, 2013) |
|---|---|---|
| α1 |  |  |
| α2 |  |  |
| α3 | * |  |
| β1 |  or |  |
| β2 |  |  |
| γ1 |  |  |
| γ2 | * |  |
| γ2[I] |  |  |
| δ1 |  |  |
| δ2 |  |  |
| δ3 | * |  |
| ε1 |  |  |
| ε2 |  |  |
| ε3 |  |  |
| ε4 |  |  |

**Legend:** * – not developed on millimeter paper (milestone 2) but directly on the score (milestone 4)

With the previous table, it is perceptible that specific categories clearly emerge from this type of classification. In this perspective, α gathers mainly the linear materials; β is a category with the microchromatic structures (being it strict–β1–or largely expanded–β2–in terms of range); γ can present melodic passages with changing intervals (also with strict–γ1–or more expanded ranges–γ2); δ reunite the waveform profiles without any connection with previous materials being thus independent and presenting new elements; and ε presents profiles that polarize specific notes and creates melodies turning around them by visually creating a line surrounded by a waveform (also referring to complex square waves). These recurrent structures are better described in Table 6-6.

***Table 6-6***. Characterization of motivic profiles in «*Métaux*».

| Name | Meas. | Summary characteristics | Graphic representation |
|---|---|---|---|
| α1 | 1-20, 29-34, 75, 85, 101-9 | line of repetitive notes–rhythmically regular or irregular |  |
| α2 | 35-64, | material that could be considered as two parallel lines or a sequence of two alternated points–rhythmically irregular<br>maximum range: perfect fifth (variable each time it reappears) |  |
| α3 | 169-79 | twelve parallel lines (two per player)–rhythmically regular<br>range by each player: minor third |  |
| β1 | 19-29 | sawtooth wave with ascendent or descendent characteristics, microchromatic passage–rhythmically regular<br>maximum range: major second |  |
| β2 | 72-5, 83-5, 92-5, 96, 134, 156-66 | triangle wave, microchromatic passage–rhythmically regular<br>maximum range: minor tenth |  |
| γ1 | 35-43, 49-71 | stable complex wave, *kotekan* structure, with arborescences–rhythmically regular<br>maximum range: major third |  |
| γ2 | 75-77, 139-149 | complex wave, *kotekan* structure, with arborescences–rhythmically irregular<br>maximum range: augmented eleventh (variable each time it reappears) |  |
| $\gamma2^{I}$ | 78-82, 86-90, 127-33, 138-9 | complex wave, with arborescences–rhythmically irregular<br>maximum range: diminished ninth (variable each time it reappears) |  |
| δ1 | 90-5, 97-8, 131 | stable sinusoidal wave–rhythmically regular<br>maximum range: major seventh (the first time but variable to each time or voice it reappears) |  |
| δ2 | 106-12, 114-26, 153-66 | stable complex wave with arborescences–rhythmically irregular<br>maximum range: augmented fourth (the first time but variable to each time or voice it reappears) |  |
| δ3 | 149-53 | stable complex wave with arborescences–rhythmically regular<br>maximum range: augmented eleventh (variable to each voice in which it is applied) |  |
| ε1 | 101-116 | stable complex wave with arborescences–rhythmically irregular<br>maximum range: augmented fourth |  |
| ε2 | 106-12, 114-26 | a variation of ε1 that recurrently returns as a motivic element, stable complex wave–rhythmically irregular<br>maximum range: perfect octave (the first time but variable to each time or voice it reappears) |  |
| ε3 | 110-20 | stable complex wave–rhythmically irregular<br>maximum range: augmented fourth (the first time but variable to each time or voice it reappears) |  |
| ε4 | 154-168 | a mixt of arborescent and complex square wave–rhythmically irregular<br>maximum range: augmented eleventh |  |

These recurrent structures in «*Métaux*» present thus a certain typology, with their characteristics pointed out in Table 6-6 above. The typology of this material is mainly characterized by the fact that certain structures are variations of a common kind of pattern. The classified structures point once more to the basic principle of the unfaithful repetitions, connecting materials of different sections that appear to lack a common ground basis but are characterized by similar morphology and affinities. Another interesting aspect is a sort of progressive complexification of the materials from α to ε. At the first structures (α category) linear materials are exclusive, in β sawtooth and triangle wave forms are evident, turning to more complex waves in γ and δ and being, at the end, treated in a more complex context by the intense ramification of the arborescent structures typically used in ε. As will be later indicated, this progressive complexification of motivic structures is also reinforced by the densification of textures and superposition of different treatments. Some of these structures are also used in specific ranges while others are typically used in the whole range of the instrument, denoting particular ways to depict each morphology as characterizable and recognizable.

### 6.3.2 Formal organization

Based on the material described above, the range in which they are presented and the development of formal structures, the sections and subsections are classified according to Table 6-7 as follows.

***Table 6-7***. Classification and characterization of Sections, Subsections and Parts in «*Métaux*».

| Section | Subsection | Part | Meas. | Summary characteristics | Texture | Players |
|---|---|---|---|---|---|---|
| A | A1 | $A1^{I}$ | 1-7 | unison then polyrhythms based on the central note of the Sixxen (noted as $D^5$) | simple cluster | tutti |
| | | $A1^{II}$ | 7-19 | return to unison then polyrhythms based on the central note of the Sixxen (noted as $D^5$) | S.H. | tutti |
| | A2 | $A2^{I}$ | 19-23 | ascending microchromatism played with repetitive three notes in polyrhythms | W.F. S.H. | tutti |
| | | $A2^{II}$ | 23-29 | descending microchromatism played with repetitive three notes in polyrhythms | W.F. S.H. | tutti |
| | A3 | | 30-34 | return to unison based on a neighbor central note of the Sixxen (noted as $C^5$) | unison | tutti |
| B | B1 | $B1^{I}$ | 35-44 | melody with three high notes of the Sixxen by players A and F (like-*kotekan* material) and an accompaniment with lower ones by BCDEF (colotomic structures) | Mel. | A(BCDEF) |
| | | $B1^{II}$ | 44-61 | motif of the accompaniment rhythmically restructured and presented in polyrhythmic phasing (sound halo) by BCDE with A and F with interlocking melody (*kotekan*) | Mel. | AF(BCDE) |
| | | $B1^{III}$ | 61-64 | end of the polyrhythms and appoggiaturas at the accompaniment (by BCDE), continuation of the melodic structure (by A and F) | Mel. | AF(BCDE) |
| | B2 | $B2^{I}$ | 65-77 | each voice presents a melody of three high notes (complex *kotekan*) and it tends to a unison that develops an entire passage with microchromatism excerpts also | unison | tutti |
| | | $B2^{II}$ | 78-83 | a new motif is presented in different voices followed by C as a soloist | solo | C(ABDE) |
| | | $B2^{III}$ | 84-88 | return of some characteristics of part $B2^{I}$ and variation on the new material presented in $B2^{II}$ | unison solo | tutti |

***Tab. 6-7***. Cont.

| | | | | | | |
|---|---|---|---|---|---|---|
| (B cont.) | B3 | $B3^{I}$ | 89-95 | motif presented in $B2^{II}$ is transformed and a new treatment of melodic aspects in waves by scale motion and polyrhythms on different voices appear progressively | W.F. | tutti |
| | | $B3^{II}$ | 95-100 | motif presented in $B2^{II}$ triggers again a wave treatment of the melodic voices in a rarefied way | W.F. | ACEF |
| C | C1 | $C1^{I}$ | 101-106 | a little range melodic line (player E) is accompanied by unison attacks in the other voices | Mel. | E(ABCDF) |
| | | $C1^{II}$ | 106-113 | the accompaniment is restraint to fewer voices that progressively turn to wave polyrhythmic lines, player E continues the same previous pattern in loudest dynamics | Mel. | E(ABCDF) |
| | | $C1^{III}$ | 114-120 | E and F present a similar behave but with polyrhythmic differences, the other voices present wave materials | W.F. S.H. | EF(ABCD) |
| | | $C1^{IV}$ | 121-126 | all voices present the wave melodic comportment | W.F. S.H. | tutti |
| | C2 | | 127-138 | return of some previous materials and motif from section B and development of the anapest motif, evolving of the densest melodic wave comportment | W.F. (S.H.) | tutti |
| | C3 | $C3^{I}$ | 138-149 | passage eminently in unison | unison | tutti |
| | | $C3^{II}$ | 149-153 | return of total wave melodic comportment | W.F. | tutti |
| D | D1 | $D1^{I}$ | 154-157 | new motivic material presented by A and polyrhythmic wave comportment in C and D with pedal note on lowest note | W.F. | ABC |
| | | $D1^{II}$ | 157-160 | previous material by A is presented again and imitated by B, E and F, the polyrhythmic wave comportment in C and D increases and turn more complex | W.F. | tutti |
| | | $D1^{III}$ | 161-166 | variations appear in all voices and previous motivic materials of sections B and C returns extremally transformed | W.F. | tutti |
| | | $D1^{IV}$ | 167-168 | a rhythmic unison with approximately the same melodic profile characterizes a strong last homophonic texture | homo-phony | tutti |
| | D2 | | 169-179 | a last cluster surges with some sporadic polyrhythms and is characterized by a large crescendo and decrescendo | complex cluster | tutti |

**Legend:**
Mel. – melody with accompaniment W.F. – superposition of waveforms S.H. – sound halo

The Fig. 6.23 highlights the development of the profiles and materials in relation to the range of the instrument and the successive temporal disposition.

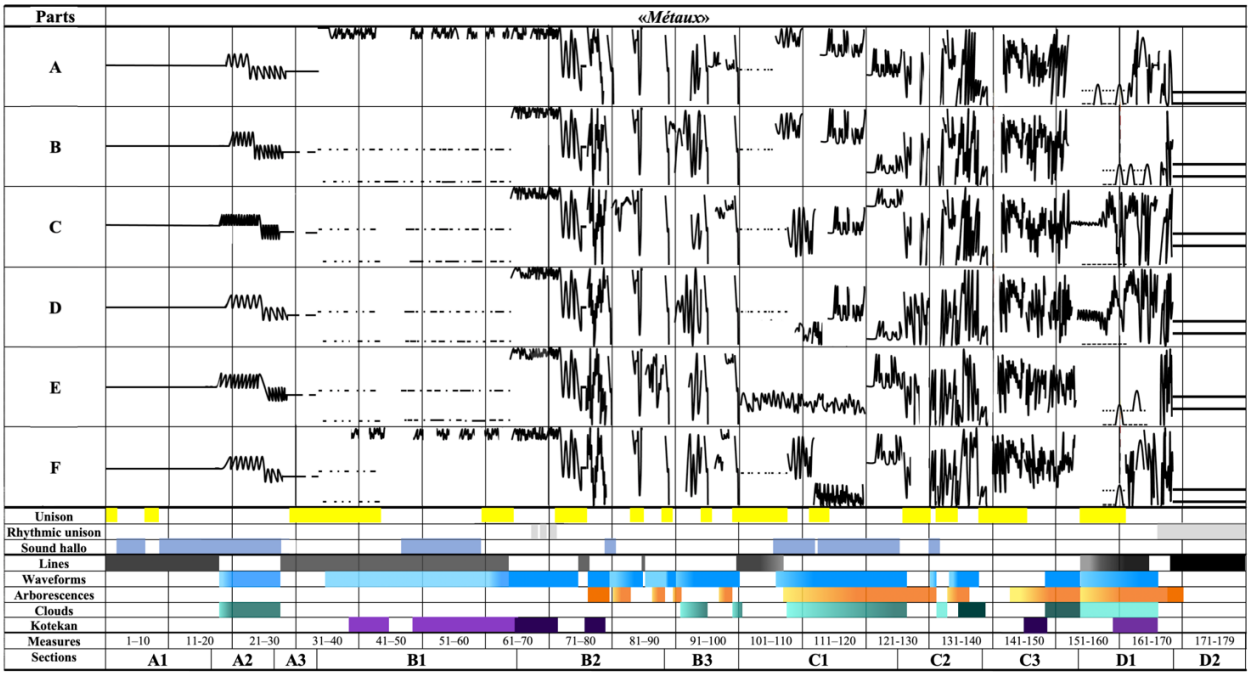



***Figure 6.23***. Schematic representation of «*Métaux*» showing the range, the shape, and the texture of melodic profiles.

The figure above indicates that the first material is in the middle range and evenly divides the instrument in two parts. After this initial unison moment, there is a variation by polyrhythmic superposition of attacks, followed by the first melodic variation produced by microchromatic movements. Even with some variations, all of Section A is presented as eminently in the middle region of the SIX-XEN.

Section B initially presents a clear division of the instrument in two ranges, with a melody occurring in the high and an accompaniment occurring in the low (Subsection B1). Then, there is a concentration of all musicians in the higher range (beginning of B2) and the continuous development of materials from the high to the low region, being thus the first time that the entire instrument is presented by descending and ascending melodic profiles. The presentation of the complete range remains a characteristic of the Section B until its end, when Section C returns to the middle range with a series of attacks for five musicians and a melody in the middle low range played by one musician. C1 is extremely clear in the presentation of materials in specific regions of the instrument, while C2 and C3 demands the complete range of the SIX-XEN once again. Section D1 represents a superposition of different materials that occupies the complete range of the instrument and the conclusive D2 is concentrated in the medium-lower and lower region, excluding notes from the central one to the above. This development returns stable lines similar to the beginning, but on a different note and they occupy the complete lower half of the SIX-XEN by alternate distribution to each musician.

The figure above also indicates a constant cumulation of materials all throughout the sections. This means that profiles and textures are progressively complexified, densified and superposed with either their variations or with new materials. It is thus perceptible that Sections C and D have the most complex, dense and charged passages of the movement. The only exception to this is the conclusive Section D2 in which only lines are presented.

Observing the melodic profiles used by the composer, it is perceptible that there is a constant evolving of materials, as a sort of continuous transformation of one type of profile into another. This occurs directly from meas. 19, when element α1 turns to element β1 by direct switch, which turns the lines to sawtooth waves in a subtle but clear process (Fig. 6.24a). In another example, the line is transformed into a complex wave from meas. 34 (Fig. 6.24b) and direct transformation also occurs between elements different α β γ (Fig. 6.24c and d) with indirect relations between these and the δ and ε profiles.

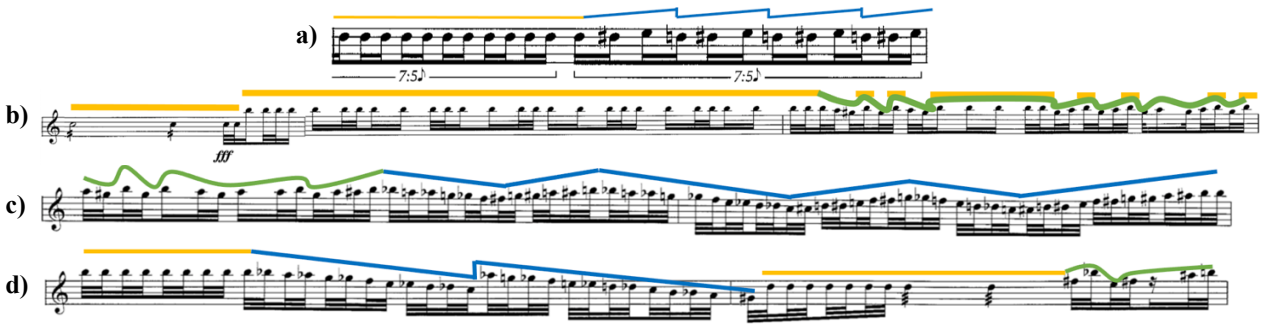



***Figure 6.24***. Succession of melodic profiles during «*Métaux*» (α in yellow, β in blue, γ in green). **a)** Source: *Pléïades*, «*Métaux*», meas. 19, player E (Xenakis, 2013) – © Éd. Salabert. **b)** Source: *Pléïades*, «*Métaux*», meas. 34-36, player E (Xenakis, 2013) – © Éd. Salabert. **c)** Source: *Pléïades*, «*Métaux*», meas. 72-73, player E (Xenakis, 2013) – © Éd. Salabert. **d)** Source: *Pléïades*, «*Métaux*», meas. 74-75, player D (Xenakis, 2013) – © Éd. Salabert.

In this perspective, it is interesting to visualize the entire movement considering the specific aspects of the development, the transformation and the correlation of melodic profiles (Fig. 6.25). The correlation of profiles at the beginning of the movement is much more stable and the changes occurs in the longer Sections A and B. Then, from Subsection C1, the material superposes in a process of more intense variation. From C2 the changes of profiles accelerate with the accrual of materials, being the Subsection D1 a typical case of accumulation and variation of previous profiles. The profiles present some tendencies in specific ranges, being initially more limited in specific regions of the instrument (e.g., α and β1 are predominant in the middle or middle-low range, γ1 in the higher), and later more open (β2, γ2, δ and ε occupies the complete range).

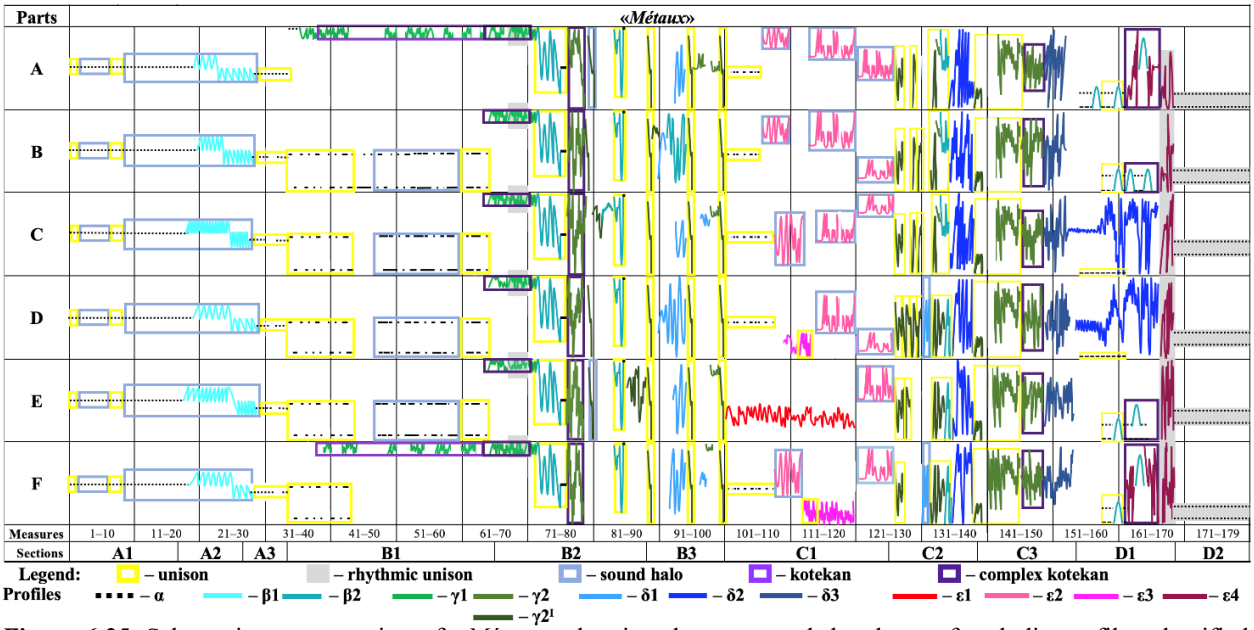



***Figure 6.25***. Schematic representation of «*Métaux*» showing the range and the shape of melodic profiles classified specifically according to the nomenclature here established.

These examples show not only correlation of materials but also a certain flux between them, with a transformation of one type into another, with «*Métaux*» constructed as a sort of constant irradiance of multitude shapes from the simple lines that are presented at the beginning of each new section. Through modifications that are established in the material, Xenakis treated the development as a continuous process of elaboration and complexification that reveals the general plan of *Pléïades* as the essential foundation of the concepts, processes and products[10]. At the same time, this continuous variation by irradiation also reveals the sonority of the SIX-XEN in different plans, be it of timbre, rhythmic potential, or melodic qualities.

### 6.3.3 Correlation with previous movements

After this overview about «*Métaux*», it is necessary to address the connections that it establishes with the previous monotimbral movements. This movement clearly presents melodic profiles consequent to waveform shapes, as it occurs in «*Claviers*», and manuscripts of «*Métaux*» could even prove the direct correlations between the dotted notation that Xenakis used during the milestone 2 and these shapes of main interest by the composer. Among other examples, the excerpts from meas. 134 to 135 (Fig. 6.26a) and 90 to 95 (Fig. 6.26b) show the superposition of a dotted notation and overwritten waveforms that are consequent. In this movement, the types of waveforms are more diversified than previously elaborated, presenting sine waves and complex waves as in «*Claviers*» but with additional sawtooth and triangle waves.

The continuous process of transformation of one waveform into another indicates that a certain fluidity between melodic profiles is generated by a succession of different waveforms (Fig. 6.26b, c and d), which shows a common ground with «*Claviers*». Another element that is recurrently used in both movements is the arborescence. Even if it is used in different ways, the complexification of passages using this sort of ramification of the waveform shape is evident (Fig. 6.27).

[10] As he stated and was previously mentioned: “the idea of periodicity, repetition, duplication, recurrence, copy, faithful, pseudo-faithful, without faithfulness” (Xenakis, 1979, p. i).

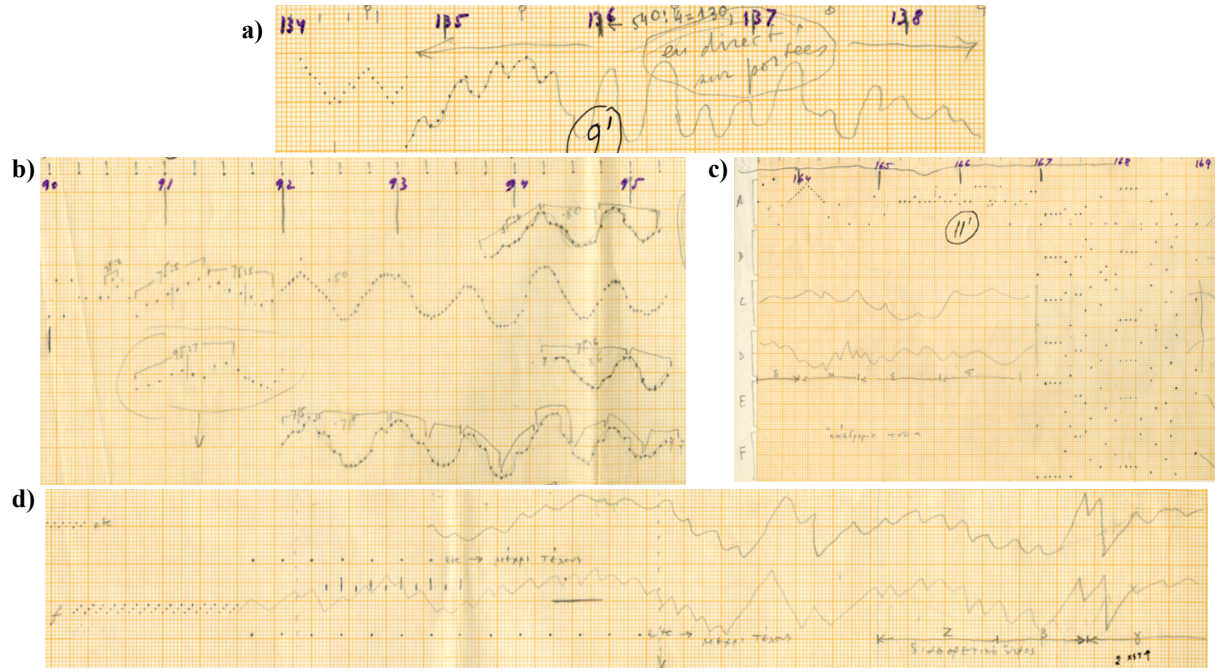



***Figure 6.26***. Waveforms present in the manuscripts of «*Métaux*» and transformations occurring between them.

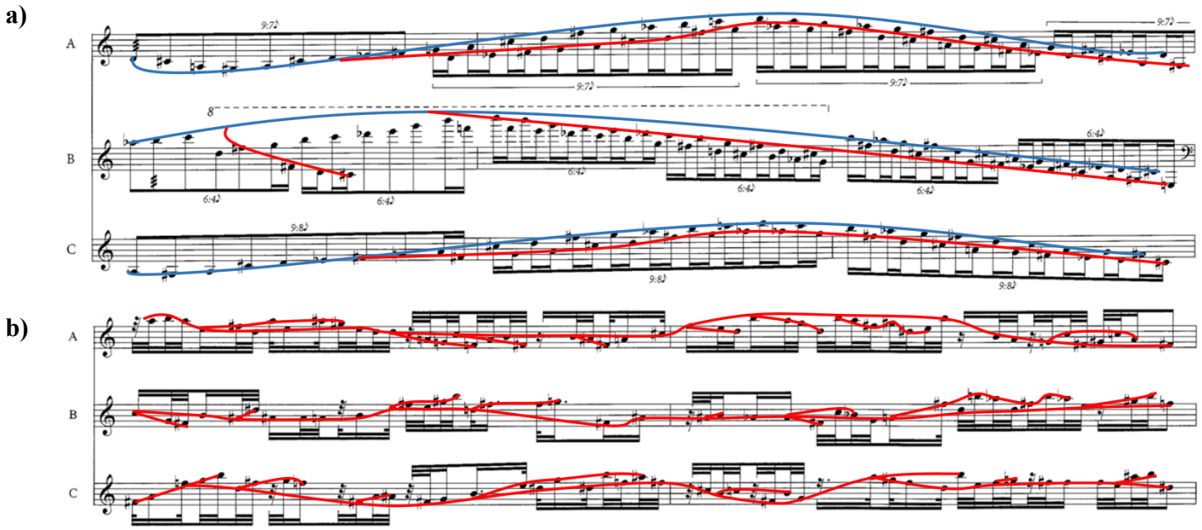



***Figure 6.27***. Presence of arborescences in «*Métaux*» and «*Claviers*». **a)** Source: *Pléïades*, «*Claviers*», meas. 104-106 (Xenakis, 2013) – © Éd. Salabert. **b)** Source: *Pléïades*, «*Métaux*», meas. 76-77 (Xenakis, 2013) – © Éd. Salabert.

Another common trait between both movements is tied to the recurrent use of the sound halo as a heterophonic texture, of which does not occur in «*Peaux*». To address some examples, the Fig. 6.28a indicates the excerpt of the introduction by the vibraphones in «*Claviers*», showing an initial unison that is decomposed rhythmically to generate the sound halo. In this case, the sound halo occurs only between three musicians and because of the main characteristic of these instruments, the structure of pitches gives the impression of a sudden reverberation in the texture.

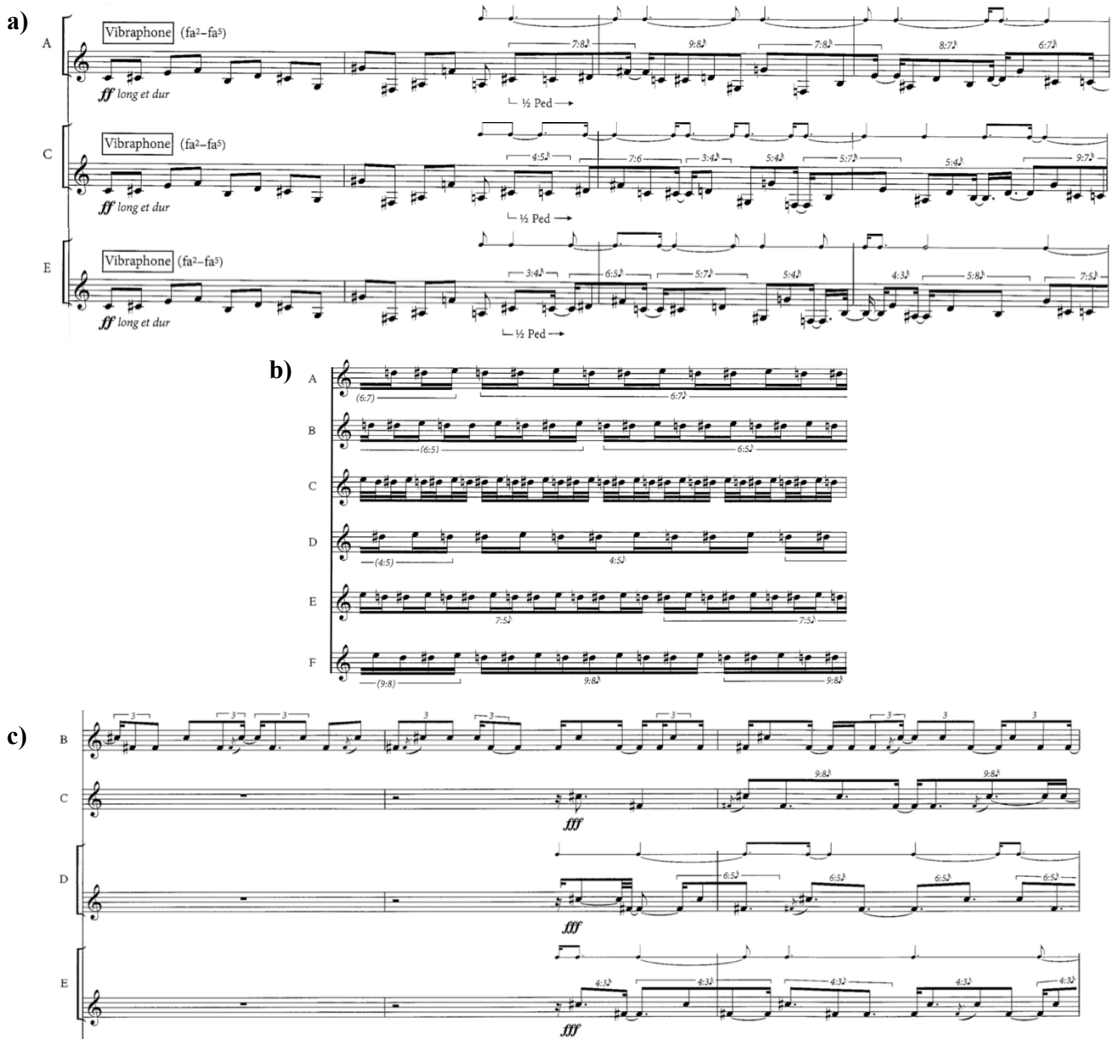



***Figure 6.28***. Structures composed in «*Claviers*» and «*Métaux*» that characterize a sound halo texture. **a)** Source: *Pléïades*, «*Claviers*», meas. 1-4 (Xenakis, 2013) – © Éd. Salabert. **b)** Source: *Pléïades*, «*Métaux*», meas. 22 (Xenakis, 2013) – © Éd. Salabert. **c)** Source: *Pléïades*, «*Métaux*», meas. 46-48 (Xenakis, 2013) – © Éd. Salabert.

In another excerpt of «*Métaux*» (Fig. 6.28b), the sound halo is produced by rhythmic differences in a motif played in three different bars of the Sixxen. As a result of the tutti, the main characteristics of the Xenakian instrument and the very dense presence of notes, this excerpt sounds completely different, not highlighting a reverberation but more of a dense and noisy texture with enormous amount of beating effects. During «*Métaux*», Xenakis is not using the sound halo always the same way. In an excerpt created with two bars of the Sixxen (Fig. 6.28c), a lighter texture with a predominantly motivic material is presented rhythmically in phase. The texture is thus common between both movements, but the results are completely different.

The correlations between «*Peaux*» and «*Métaux*» were produced connecting other structural characteristics and are mainly guided by the contrast between metricity and arrhythmicity. They could thus be traced considering the rhythmic elements of the profiles and the fact that anapest and dactyl motives are recurrent, as well as the techniques of pattern compression and expansion based on whole

numbers. Some common profiles could be considered when comparing «*Peaux*» and «*Métaux*», being the profiles characteristically linear shapes. Even if characterized by different sonorities and textures associated, they can be perceived in some parts of the milestone 2 of both movements (Fig. 6.29). In «*Peaux*» they are integrated in a larger context and superposed with other profiles (Fig. 6.29a) while in «*Métaux*» they are initially independent and treated separately from other materials that are consequential and not superposed (Fig. 6.29b). The profile of two parallel lines is also recurrent in both movements (Fig. 6.29c and d).

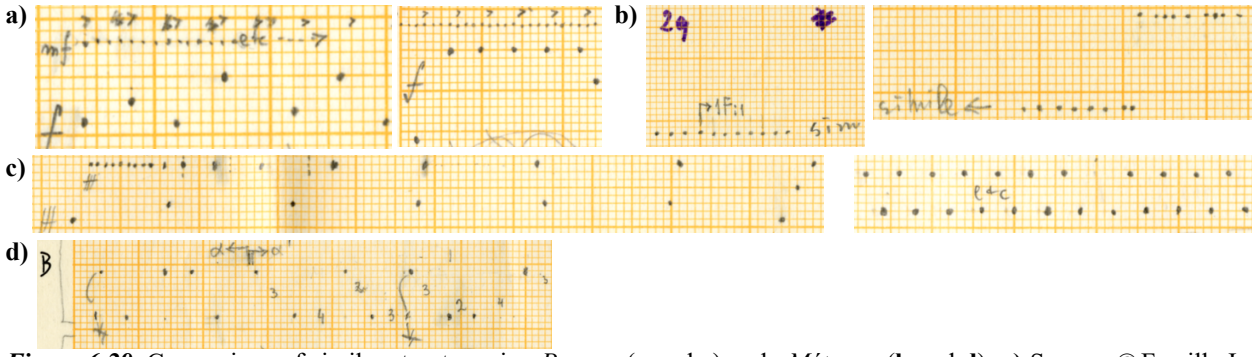



***Figure 6.29***. Comparison of similar structures in «*Peaux*» (**a** and **c**) and «*Métaux*» (**b** and **d**). **a)** Source: © Famille I Xenakis DR (OM 28-17, pp. 17 and 19). **b)** Source: © Famille I Xenakis DR (OM 28-17, p. 03). **c)** Source: © Famille I Xenakis DR (OM 28-17, pp. 17 and 19). **d)** Source: © Famille I Xenakis DR (OM 28-17, p. 03).

The presence of anapest and dactyl motives are recurrent in «*Métaux*», as they aided the composer to organize some rhythmic ideas, develop textures and the metric characterization of the movement as a whole. The anapest was the main motive, typically used to differentiate sections and subsections (Fig. 6.30). Some rhythmic motives are presented equally in both movements (Fig. 6.30c) but adopted in different sonic contexts.

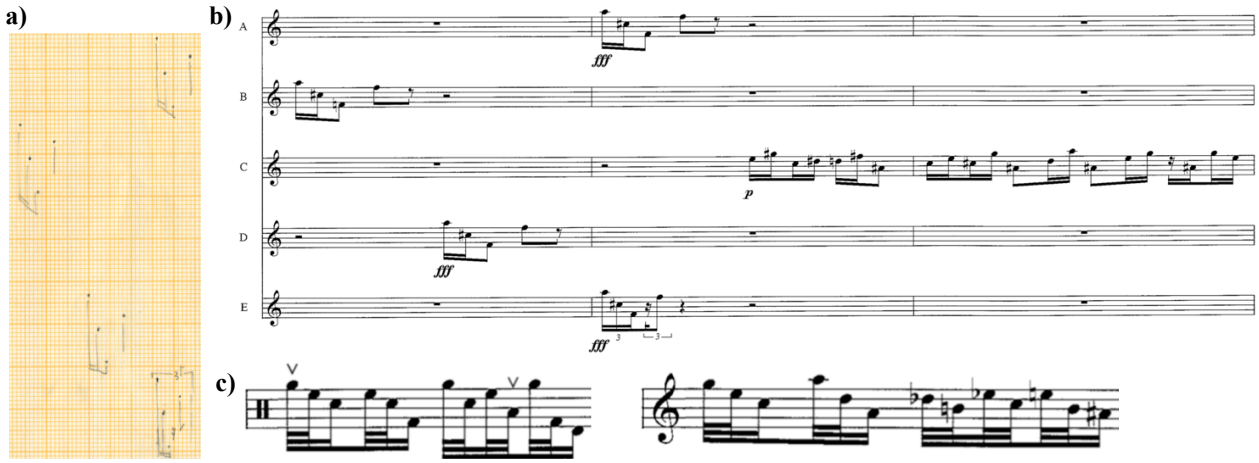



***Figure 6.30***. Anapest motives in «*Métaux*». **a)** Source: © Famille I Xenakis DR (OM 28-17, p. 5). **b)** Source: *Pléïades*, «*Métaux*», meas. 79-80, tutti (Xenakis, 2013) – © Éd. Salabert. **c)** Rhythmic motive in «*Peaux*» (left) and «*Métaux*» (right).

Ceuster (2021, p. 77) stated that “Throughout *Métaux* one can hear different forms of rhythms, ranging from strong rhythmic patterns in unison, to strong patterns with subtle but stark irregularities, to a superposition of clear rhythmic periodicities and non-synchronized rhythms, to fully non-synchronized clusters.” Excluding the reference to clusters, the above typically occurs in «*Peaux*». By comparison, «*Claviers*» has more arrhythmic subsections, being primarily a constant exploration of fluid passages. The characteristics of commetricity and contrametricity are fundamental in «*Peaux*» and «*Métaux*», as they define the exploration of main sections and variation. In this way, some rhythmic textures present even more similarities in their resulting macrostructures (Fig. 6.31).

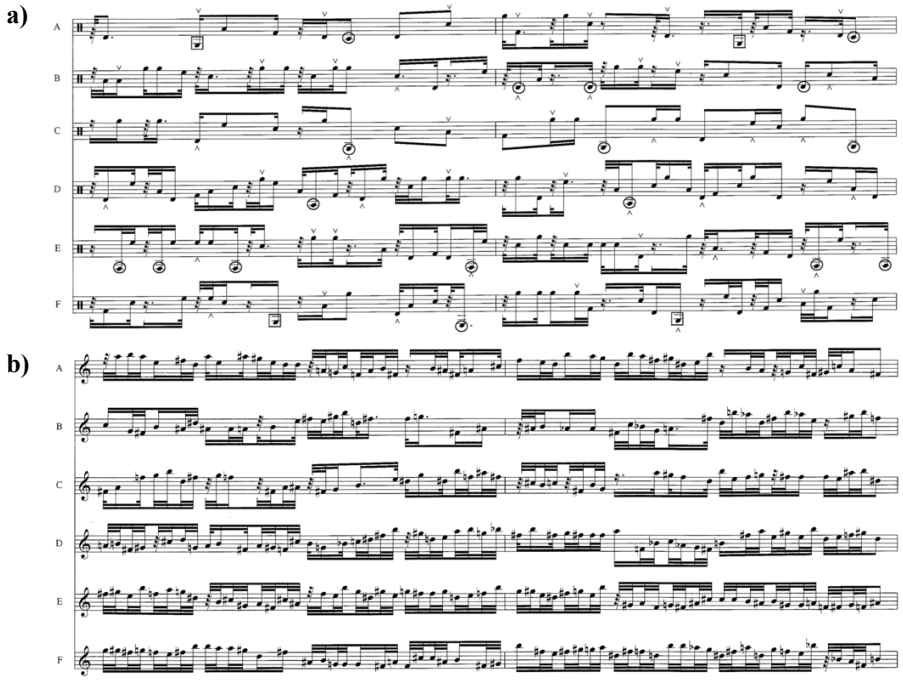



***Figure 6.31***. Comparison of two excerpts of «*Peaux*» and «*Métaux*» with a correlated textural treatment. **a)** Source: *Pléïades*, «*Peaux*», meas. 46-47 (Xenakis, 2013) – © Éd. Salabert. **b)** Source: *Pléïades*, «*Métaux*», meas. 76-77 (Xenakis, 2013) – © Éd. Salabert.

The end of «*Métaux*», that was initially written differently, presents similarities with «*Peaux*». As visible in the manuscripts, an attenuation of the intense waveforms played by all musicians in meas. 169 would be progressively stabilized in the central note of the SIX-XEN from 174 (Fig. 6.32a). The ending that remained only in the manuscripts narrates a completely different possible concept about the movement. Because the note that begins the movement would be the same that would finish it, and with this return to the same texture, there would be a development arc consequential of one unique note, as if all material developed from and revolved around this sound. However, what ultimately arose is a texture characterized by a complex cluster between all the musicians (Fig. 6.32b). The conclusion presents all notes below the central tone excluding the $D^5$,

highlighting the low region of the instrument and opening its spectrum in a unique passage of the movement.

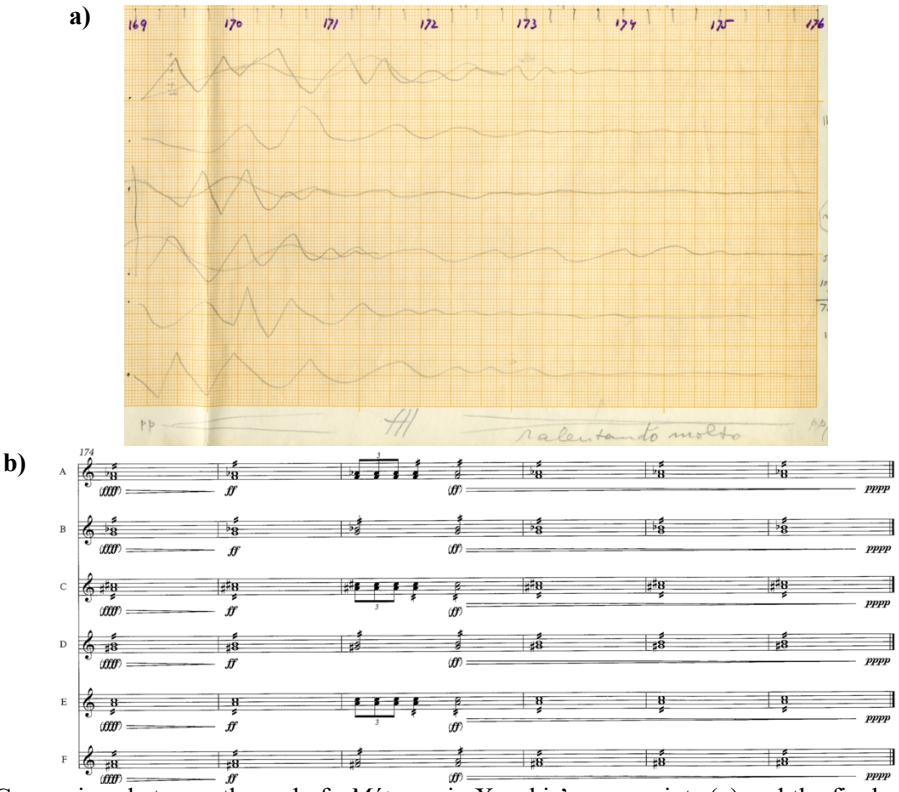



***Figure 6.32***. Comparison between the end of «*Métaux*» in Xenakis' manuscripts (**a**) and the final score (**b**). **a)** Source: © Famille I Xenakis DR (OM 28-17, p. 8). **b)** Source: *Pléïades*, «*Métaux*», meas. 174-179 (Xenakis, 2013) – © Éd. Salabert.

While this passage is idiomatic of the SIX-XEN characteristics due to the complex cluster, it also correlates with the end of «*Peaux*». The manuscripts shows that they would initially present very different materials, but both conclusive parts were changed and finished to be characterized by a texture that presents a large decrescendo of a rhythmic unison based on 16th notes.

### 6.3.4 Specific materials

Even if certain passages reestablish characteristic treatments previously adopted in «*Claviers*» and «*Peaux*», new procedures and materials are still presented in «*Métaux*». In this perspective, it is necessary to consider four elements: waveforms, a particular type of glissando, clusters and the *kotekan* texture. While the *kotekan* texture is consequential of Xenakis' interests in Indonesian music, the first three are directly connected because the specificities of the triangle wave characterize a glissando that, due to the SIX-XEN sonorities, is perceived as a cluster.

The characteristic and exclusive specific waveforms in «*Métaux*» are the sawtooth wave (characteristic of the beginning of the movement), the triangle wave (recurrent all over the movement and treated in different ways), and the complex square waves (characteristic of the conclusive passages), as exemplified in the Fig. 6.33. By coincidence, the sawtooth and the triangle wave also make the glissando phenomena possible. The glissandi that are continuous and occurs in the conclusion of «*Peaux*» are made possible by the timpani, but the glissandi in «*Métaux*» are discrete and found constantly modified and structurally developed since the first section. To achieve this effect, Xenakis adopted sequences of neighboring notes to make passages that are explored in order to highlight the proximity of sounds, as in a discrete chromatic glissando passage of a tempered instrument. However, since the Sixxen is characterized by sounds smaller than a semitone, the term microchromatism (and by consequence microchromatic) will be used to designate the passages noted as if they were chromatic but that, because of the microtonal aspect of the instrument, denote a particular type of sonority. These passages can occur in short or long passages and in a narrower or a wider range (Fig. 6.33), and these parameters are used in different ways by the composer (tutti in unison, in solo, trios, or quartets). These structural passages reinforce the glissandi aspect of the instrument (as described with more details on Chapter 3–Section 3.3.3) and they are characterized by a visual shape presented in the manuscripts as sawtooth waves (Fig. 6.33a) or triangle waves (Fig. 6.33b and c).

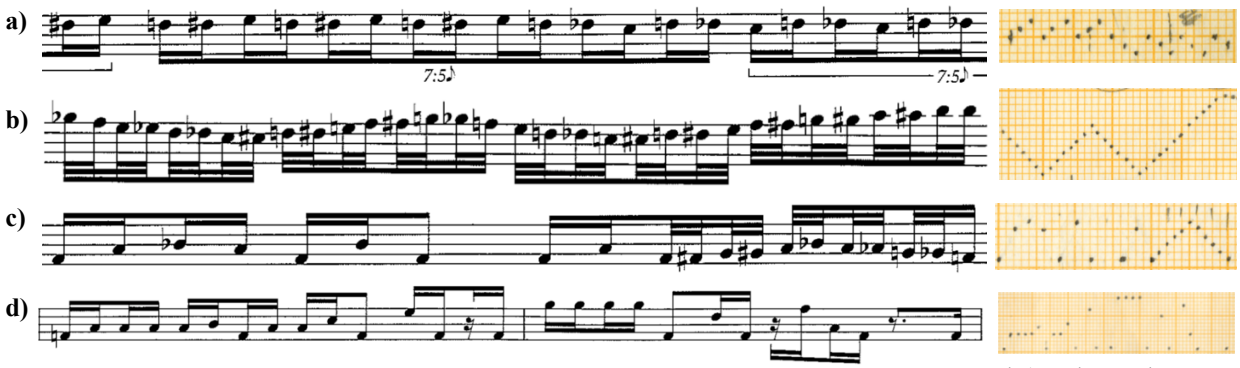



***Figure 6.33***. Excerpts with microchromatic passages characterizing a discrete glissando (**a**, **b** and **c**) and complex square wave (**d**). **a)** Source: *Pléïades*, «*Métaux*», meas. 25, player E (Xenakis, 2013) – © Éd. Salabert. **b)** Source: *Pléïades*, «*Métaux*», meas. 73, tutti (Xenakis, 2013) – © Éd. Salabert. **c)** Source: *Pléïades*, «*Métaux*», meas. 156, player A (Xenakis, 2013) – © Éd. Salabert. **d)** Source: *Pléïades*, «*Métaux*», meas. 167-168, player A (Xenakis, 2013) – © Éd. Salabert.

This connection between the waveform and glissando sonorities is prevalent throughout the movement, being the first motivic material in the introduction that characterizes a range expansion of the instrument by microchromatic movements (Fig. 6.33a). In the first appearance, the effect is created with three notes constantly repeated and it will later be expanded with a continuous presentation of the SIX-XEN sonorities and possibilities. Beginning with these subtle microchromatic

glissandi, the composer developed various consequential materials with a wider range (Fig. 6.33b), presenting an amalgamated version in the final sections inside phrases (Fig. 6.33c) that will originate the complex square wave (Fig. 6.33d).

The presence of clusters as a specific material is clear in «*Métaux*», not only because the SIX-XEN in itself has the cluster as a main characteristic (as sparsely pointed in Chapter 3–Sections 3.3.1, 3.3.2 and 3.3.3), but also because Xenakis expanded this intrinsic property to relate with more sonorities. He applied these clusters in different contexts, generating varied ways of perceiving this kind of structure. In this perspective, two different types of clusters are seen throughout the movement: simple or complex clusters. The simple clusters appear when the same note is played by at least four players (generally it is done by all six), reflecting the fact that the instrument is based on the micro-difference of frequencies of its internal properties. This is the first sonority and also the introduction of the movement, being the initial sound phenomenon that occurs from meas. 1. This kind of simple cluster is later developed as an accompaniment, as rhythmic attacks and as melodic structures (Fig. 6.34). This last development, characterized as a melodic sequence of cluster (a fast succession of events that are heard as a complex melodic line with specific timbre qualities), dialogues directly with the glissando effect, as previously described.

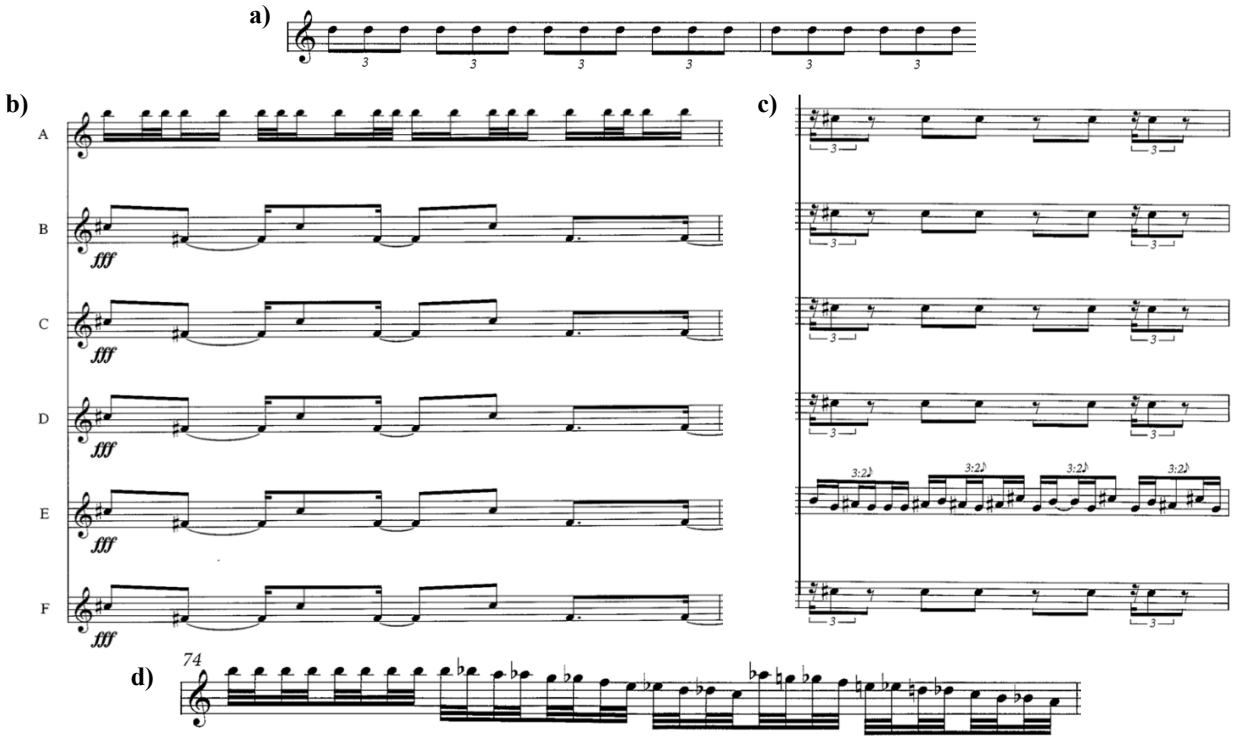



***Figure 6.34***. Examples of simple clusters developed in «*Métaux*». **a)** Source: *Pléïades*, «*Métaux*», meas. 1-2, tutti (Xenakis, 2013) – © Éd. Salabert. **b)** Source: *Pléïades*, «*Métaux*», meas. 35 (Xenakis, 2013) – © Éd. Salabert. **c)** Source: *Pléïades*, «*Métaux*», meas. 104 (Xenakis, 2013) – © Éd. Salabert. **d)** Source: *Pléïades*, «*Métaux*», meas. 74, tutti (Xenakis, 2013) – © Éd. Salabert.

The complex cluster is created by the superposition of different notes in the different sixxens but near enough to still characterize the sonic effect. By comparison, and because of the use of one unique metallic bar, the simple cluster is closer than the complex cluster (Fig. 6.35). The complex cluster is more expansive of the frequencies and aggregation of frequencies of different bars, being typical of the conclusive section of «*Métaux*» (Fig. 6.35b).

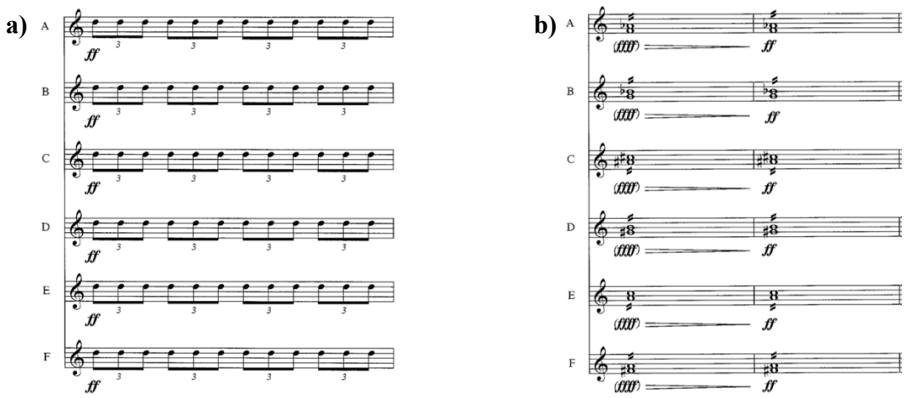



***Figure 6.35***. Comparison between a simple cluster and a complex cluster in «*Métaux*». **a)** Source: *Pléïades*, «*Métaux*», meas. 1 (Xenakis, 2013) – © Éd. Salabert. **b)** Source: *Pléïades*, «*Métaux*», meas. 174-175 (Xenakis, 2013) – © Éd. Salabert.

By a continuous development of the effect of cluster, Xenakis expanded the concept of the main sonority of the instrument to all the movement. As one of the most important guidelines defining the SIX-XEN, «*Métaux*» directly reflects the fact that the piece begins and ends as a synthesis of the continuous expansion that amplifies the dimension of the compositional structures echoing the object's acoustic and physical characteristics. It is important to mention that each prototype constructed has specific qualities, producing by consequence sonorities of equally distinctive clusters. However, independent of the specificities, the composer maintained structures that expose this intrinsic property that depicts further the particular qualities of one Sixxen or another. The plurality takes form as a particular Sixxen and as the composition, or as object and concept, being intrinsically and extrinsically observable. In this total expansion of the inherent properties of Xenakis' instrument, there is also an effort to enlarge the dimension of the hearing phenomena.

The interests in specific textures and structures during «*Métaux*» are not only tied to specific acoustic phenomena, but also connects with extra-European music. It is important to note that this structure is characterized by at least two complementary melodies that result in a single melody perceived, and the same aspect is present in *Pléïades*. In this way, the movement has a passage that reflects a *kotekan* accompanied by colotomic instruments (Fig. 6.36).

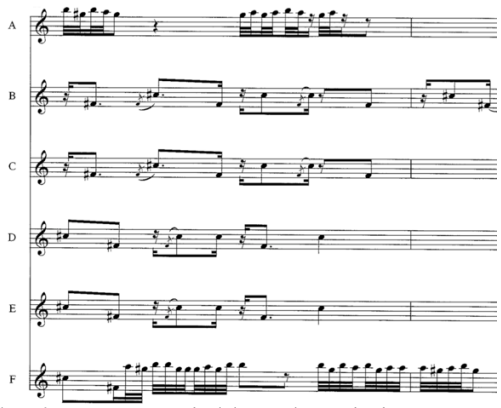



***Figure 6.36***. Texture similar to a *kotekan* accompanied by colotomic instruments as presented in «*Métaux*». Source: *Pléïades*, «*Métaux*», meas. 43-44 (Xenakis, 2013) – © Éd. Salabert.

The *kotekan* will be further discussed in Chapter 7 (Subchapter 7.3) because of its connections with Indonesian musical traditions and the gamelan repertoire. In «*Métaux*», this occurs from meas. 35 when a melody, initially presented by player A is interlocked with a complementary melodic line elaborated upon by player F and develops progressively, to then include all the musicians. The *kotekan* is a new material and has different treatments in sections throughout the movement, being exclusive of this monotimbral movement and showing that the composer also associated the sonority of his instrument in a broader context of compositional structures correlated with the Indonesian musical materials.

### 6.3.5 The SIX-XEN in «*Métaux*»

After presenting the previous aspects, it is important now to address what they indicate specifically in relation to the SIX-XEN. The fact that «*Métaux*» presents correlations with «*Claviers*» and «*Peaux*» could signify that the SIX-XEN sonorities are situated in an intermediary position in terms of pitched and unpitched instrumental categories. The Xenakian instrument is not only a musical object but also a defying tentative to expand the human hearing, and is a method to blur the boundaries that separate initially closed categories and to promote the continuity between them as gradual processes of transformation. While the instrument could be considered as eminently inharmonic, it can be treated to present melodic qualities independently if it is considered collectively with all six unities or in fractions. The composer sought to highlight its potential in a wide range of frequency possibilities and also aimed to create a bridge between the two extremes of the perception of a sound, from pitch to noise or vice-versa. Constructors can choose and define characteristics among this range of possibilities without eluding the ambiguity at the heart of this instrument situated in the interstices of the sonic properties, as such, an "in-between" instrument. In this perspective, this is also emphasized in the way in which Xenakis composed *Idmen A B* (1985), the second piece that

features the SIX-XEN. In this work, the instrument replaces percussion keyboards and/or unpitched percussion instruments depending on the musicians' choices (as detailed in Chapter 4–Section 4.2.3). In both cases (*Pléïades* and *Idmen A B*), the SIX-XEN remained a potential "in-between" instrument.

In the search for an innovative concept that would represent his own perspectives, he required an object that could produce melodies of noises and profiled clusters in perceptible movements from low to high or vice-versa. Because of the complex melodic treatments of «*Métaux*», this "in-between" instrument is treated very precisely in terms of range while it covers a very extensive potential of timbre development and differentiation. In this way, François-Bernard Mâche, Xenakis' friend and composer who used the SIX-XEN on different occasions, stated that "We didn't really discuss his instrument directly. What interested him was precisely that it didn't give notes but that it gave sensations of different registers, it seems to me that that's what he was looking for." (Mâche, interview by author, 2020). It is clear in the compositional treatment of «*Métaux*» that the registers of the instrument played a fundamental role in developing the differences that would characterize each section and subsection.

To demonstrate that this "in-between" instrument could be situated at the confluence of two groups, Xenakis reiterated significant compositional differences between «*Claviers*» and «*Peaux*» while he emphasized similarities of both movements with «*Métaux*». Thus, the intermediary aspects of its sonorities are also reinforced by the compositional structures shared by these movements. In this way, even the sequence of the movements («*Claviers*» and «*Peaux*») attests to an interest to present two opposed groups of structural elements that are followed by their gathering (in «*Métaux*»), concluding with the presentation of the main confluence of all previous materials (as will be highlighted in «*Mélanges*»).

In this perspective, the micro and macrostructures are reciprocally interconnected, and the instrument choices are reflected in the structures that envelop their sonorities. In terms of macrostructure, «*Claviers*» emerges from one single initial melody (Subsection A1) that irradiates in many ways to culminate in a gamelan phrase (Section D). It is an etude on melodic variations based on a continuous flow of arrhythmic structures and polyphonic waveforms melodies. On the contrary, «*Peaux*» emerges from pure rhythm, from an individual groove of two lines (Subsection A1) that irradiate to the other voices producing an immense variety of metric structures that concludes in one unique line (end of Section C). What occurs at the end of «*Peaux*» becomes material for the beginning of «*Métaux*»: it emerges from a unique line, but because of the intrinsic properties of the SIX-XEN, this line itself is a cluster. Therefore, the movement depicts intricate variations on timbre that irradiate and present continuous transformations from simple to complex clusters, allowing for a gradation between pitched and unpitched qualities.

It is important to consider that as «*Claviers*», «*Métaux*» is mostly a massive sextet with rare solos. This collective aspect is fundamental in «*Métaux*», and this characteristic is in strong contrast to the solos, duos and trios of «*Peaux*» that guide the textures and succession of sections and subsections. By coincidence, «*Claviers*» and «*Métaux*» are also the monotimbral movements with metallic timbres in which the Indonesian aspects are present (be it in terms of pitch collection, texture, rhythmic structure, and/or literal references with direct or indirect correlations).

The variation and/or transformation of a sound is a central point in *Pléïades*, but it takes different forms according to each instrumental set that Xenakis chose for each movement. In this way, the SIX-XEN was a missing sonority in the then-available instrumentation, a necessary search not only for a new object but for new processes to explore and push the boundaries of human perception limitations. As poetically mentioned by Globokar (1980), "Obviously, there are certain acoustic laws at the beginning, therefore certain impossibilities, but the invention of the composer and also of the instrumentalist are precisely there to circumvent these obstacles and, while doing so, to discover new phenomena."[11]

In the Xenakian instrument, there is an inherent continuity between pitched–unpitched, simple–complex, harmonic–inharmonic, rhythmic-arrhythmic, and periodic–aperiodic; this continuity also exists between tradition and contemporaneity and also between non-European and Western avant-garde music. This object is the achievement of the totality in sound of which the composer had sought for decades. It represents Xenakis' attempt to experiment with the continuity of the processes rather than simply gather all the possibilities side by side, to exploit the gradations between the colors rather than merely juxtaposing them. The SIX-XEN and its specific movement are thus a deep statement about processes, variation, oscillation, gradation, and continuity as the middle point of contact between different musical parameters, acoustic phenomena, musical objects and cultural processes.

## 6.4 «*Mélanges*»

As its name indicates in French, this movement was imagined to literally be a mixture. Musically speaking, it was constructed not only as a gathering of the previous instruments and timbres, but also as assembled excerpts that are replicated from the three previous monotimbral movements. Barthel-Calvet (2000, p. 536) stated that the movement presents superposition of completely heterogeneous textures. The consequence is an intensive kaleidoscopic movement with

[11] "Evidemment, il existe au départ certaines lois acoustiques, donc certaines impossibilités, mais l'invention du compositeur et aussi de l'instrumentiste sont justement là pour contourner ces obstacles et, ce faisant, découvrir ainsi de nouveaux phénomènes." (Globokar, 1980).

interesting choices to separate previous excerpts and also decisions on how to assemble them. Xenakis sought to recapitulate micro and macro structures, passages and part of textures that are reassembled with few to no changes coming from the previously elaborated monotimbral timbres. Even if the changes are minimal in recapitulated excerpts (primarily dynamic adjustments), new aural significations are the essence of the development in «*Mélanges*» by the connections not seen in the three other movements. The composer reshaped the excerpts and their aural qualities with a new acoustic environment, by re-signifying and integrating them in a new listening phenomenon. As Halbreich (1988, p. 247) mentioned, "*Mélanges* constitutes a skillful synthesis, but it only really acquires its meaning in the light of the other movements: it is the one part that should not be played separately! It took the genius of Xenakis to renew, ten years later, the supposedly unsurpassed outcome of *Persephassa*, and in a completely different way!"[12].

When consulting the manuscripts about this movement, one notices that the composer, when working with millimeter paper (milestone 2), does not use any element of traditional, graphic or pointillist writing previously used in other movements. For «*Mélanges*», he only mentioned the introduction and conclusion for each excerpt from «*Claviers*», «*Peaux*» or «*Métaux*» as "CL", "P" and "M" (Fig. 6.37). He specifically tried to fit the desired parts to be repeated and integrate these patterns into a new sound context.

**a)** **b)**

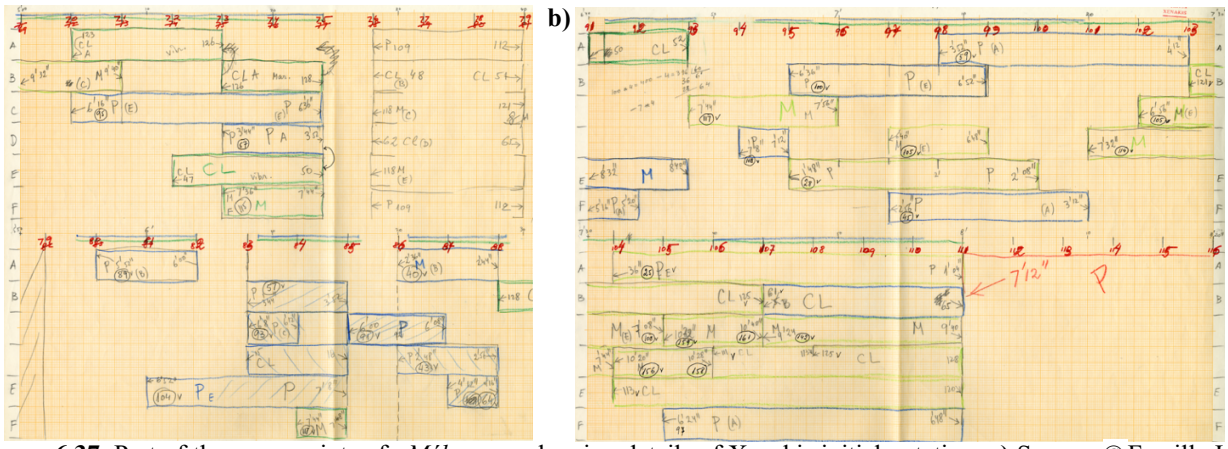


***Figure* 6.37**. Part of the manuscripts of «*Mélanges*» showing details of Xenakis initial notation. **a)** Source: © Famille I Xenakis DR (OM 28-17, p. 13). **b)** Source: © Famille I Xenakis DR (OM 28-17, p. 14a).

Since this movement is based entirely on previous materials, what will be of interest in this subchapter is to indicate how the composer gathered the materials, what relationship these materials

[12] "Mélanges costituisce una sapida sintesi, ma acquista veramente il suo significato solo alla luce degli altri brani: è l'unica parte che non si dovrebbe suonare separatamente! Ci voleva il genio di Xenakis per rinnovare, a dieci anni di distanza, l'esito che si credeva insuperabile di Persephassa, ed in un modo completamente differente!" (Halbreich, 1988, p. 247).

have with their source, why they were interesting for the new context, how he used SIX-XEN within this context, and in which context the metallic instruments of the piece (SIX-XEN and vibraphones) are articulated.

### 6.4.1 Formal organization

To achieve a coherent subdivision and characterization of sections and subsections of «*Mélanges*», the present classification was based on a broad overview of the characteristics and the grouping of the excerpts coming from previous movements (Fig. 6.38). It is perceptible thus that the monotimbral movements are recapitulated differently, characterizing two mainly sections (A and B) and a conclusive one (C, as a very short coda).

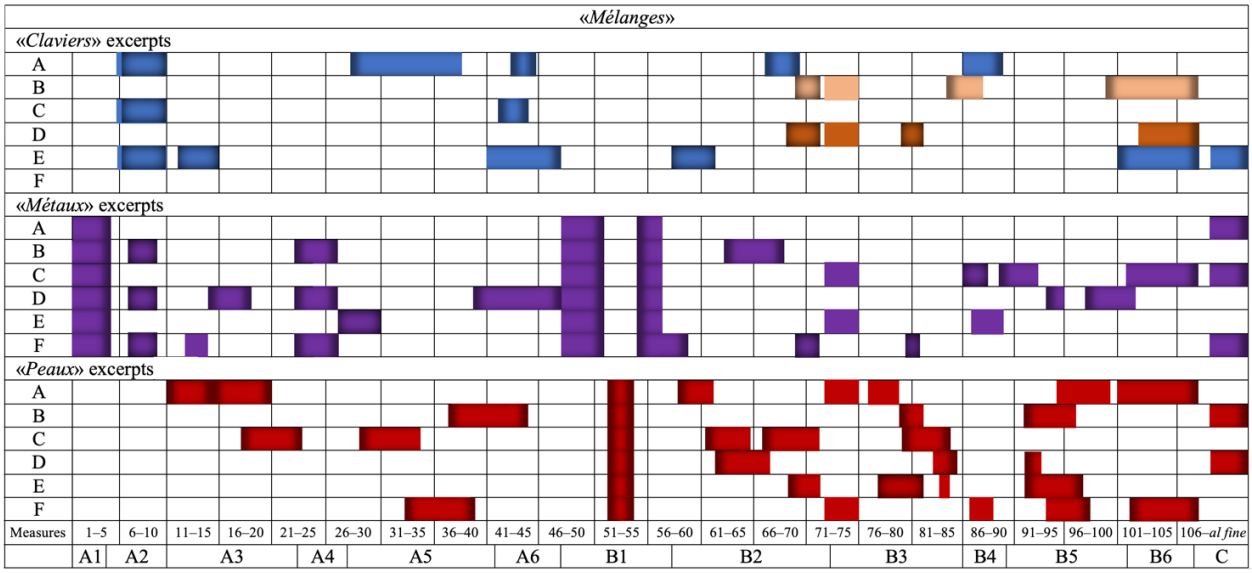



***Figure 6.38***. Positioning of excerpts present in «*Mélanges*» from each one of the three monotimbral movements and their respective players (from A to F).

Excerpts from «*Claviers*» are sparser and relatively concentrated at the beginning and end of each section (A2 and A6 in, Section A as well as B2/B3 and B6 in Section B). They are performed at maximum by three players at the same time, indicating the ACE simultaneity as a subgroup of interest again (in sections A2 and A6). The composer exclusively used the vibraphone timbre in Section A and the association of metallic and wooden instruments only in Section B which has a longer duration at the end of the movement for the concluding passage (in B6). The wooden timbres used are marimba and xylophone, and they are both used simultaneously in almost the entire recapitulation of their materials (in B2, B3 and B6). There is no recapitulation of «*Claviers*» excerpts in subsections A1, A4, and B1.

The excerpts from «*Métaux*» are arranged more regularly throughout the structure; they are prevalent, being the only movement that furnished material for all the subsections, and structuring

the major changes of sections between A and B. The use of the six unities of SIX-XEN concomitantly occurs at the beginning of the sections A and B, being the material that Xenakis used most to present the sextet with the same type of timbre. Important associations of three players (in the A2 and A4 sections as well as in the conclusion in C) and two (throughout much of the B section) also occur. The excerpts originally from «*Métaux*» are presented in greater quantity but are also concentrated in vertical blocks due to the systematic way of instrumentation choice.

On the other hand, the excerpts recapitulating «*Peaux*» are characterized by a growth of insertions throughout the movement. They are not present at the beginning of A (A1 and A2) and relatively sparse in all this section, becoming quite present in the beginning of B and more concentrated all over this section, essentially structuring the entire second section. They are generally presented by subgroups of two players but also by three or four players simultaneously, with a single section in which all six percussionists play simultaneously excerpts coming from «*Peaux*» (in B1, central section that highlights the transition of the sections).

With the previous considerations, one can observe how each monotimbral movement is characterized in a particular way in «*Mélanges*» and has its own development throughout this movement. The recapitulation ultimately adopted by the composer helped in the separation of sections and subsections as indicated in Table 6-8. It is through the association of these characteristics and the presence of certain motifs that the classification «*Mélanges*» was possible.

This movement could be considered a large continuous flow of excerpts that are spliced together as a patchwork. Xenakis ultimately highlighted certain intentions, directionalities, and priorities in his previous treatment of materials and textures, a technique that also reinforces the divisions presented here. It is evident that there are few subdivisions in parts and different subsections can be considered equivalent, with links generally made through elision of materials common to the preceding and consequent subsections. This indicates an attempt to establish some continuity in all the movement with materials of diverse origins. Fig. 6.39 allows a perception of how each player must deal with the specific instrumentation changes, bringing a broader look at the relationship and concatenation of sections and subsections. This figure also allows a visualization of how Section A is relatively less diversified in terms of overlapped timbres than Section B, where the gathering of colors blossoms and the use of excerpts is denser starting from more fractioned and shorter passages.

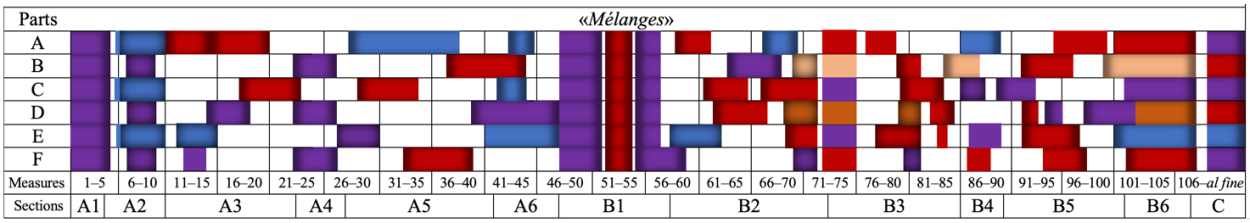



***Figure 6.39***. Presentation of all excerpts in «*Mélanges*» assembled by player.

***Table 6-8***. Classification and characterization of sections, subsections and parts in «*Mélanges*».

| Section | Subsection | Part | Meas. | Characteristics | Texture | Timbres | Players |
|---|---|---|---|---|---|---|---|
| A | A1 | | 1-4 | excerpt of one voice from «*Métaux*» presented by all musicians as an introductive homophonic texture | unison | Sixxen | tutti |
| | A2 | | 5-10 | wave melodic comportment of three polyrhythmic vibraphones confronted to precise rhythmic excerpts with sixxens (3) | W.F. | 3 vib.<br>3 sixxens | ACE / BDF |
| | A3 | | 11-23 | a drum phrase with continuous crescendo and decrescendo (on A) guides many encounters of vibraphones and sixxens in a not dense exposition of melodic and rhythmic materials | W.F. with accomp. | drums<br>sixxen<br>vib. | ACDEF |
| | A4 | | 23-26 | a homophonic texture of three sixxens develops a bridge to A5 | homo-phony | 3 sixxens | BDE |
| | A5 | | 27-41 | dense sixxen wave phrase is confronted to rarefied vibraphone phrase, drum excerpts with wave comportment will also guide the texture | W.F. | sixxen<br>vib.<br>drums | BDF / ACE |
| | A6 | | 41-47 | a combination of three successive vibraphones entries with dense materials is combined to an equally dense sixxen phrase | homo-phony | 3 vib.<br>sixxen<br>drums | ACE / BD |
| B | B1 | $B1^{I}$ | 48-51 | an excerpt of one voice from «*Métaux*» turned into a new homophonic texture (as in A1) | unison | Sixxen | tutti |
| | | $B1^{II}$ | 52-54 | drums repetitive phrase (with rare new materials) contrasts to the sixxen materials | unison | drums | tutti |
| | | $B1^{III}$ | 55-57 | a homophonic Sixxen texture delimits the end of introduction of B | homo-phony | Sixxen | tutti |
| | B2 | | 58-72 | a progressively denser subsection culminates in the first appearance of wood instruments (xylophone and marimba respectively) | W.F. with accomp. | vib. sixxen<br>drums<br>mar. xyl. | ABCDEF |
| | B3 | | 73-75 | a dense polyrhythmic texture with wave comportment characterizes all voices | W.F. | 2 sixxens<br>xyl. mar. drums | tutti |
| | B4 | $B4^{I}$ | 76-85 | successive inputs of polyrhythmic materials with dense texture, a certain stability and lower density is clear from meas. 82 | W.F. | drums<br>sixxen<br>xyl. mar. | ABCDEF |
| | | $B4^{II}$ | 86-89 | stable passage with many timbres and without complex polyrhythms | Mel. | vib. mar. drums<br>2 sixxens | ABCEF |
| | B5 | | 90-101 | successive inputs of eminently rhythmic materials create a quite stable passage with rarefied wave motion | W.F. with accomp. | drums<br>sixxen<br>vib. mar. | ABCDEF |
| | B6 | | 102-107 | a very dense polyrhythmic texture is presented with extreme higher level of dynamics and melodic wave motion | W.F. | vib. mar. xyl.<br>2 sixxens<br>drums | tutti |
| C | | | 108-113 | rolls on drums contrasts with wave comportment of metallic instruments, a new material for vibraphone is present | W.F. | 3 sixxens<br>drums<br>vib. | tutti |

**Legend:**
accomp. – accompaniment
mar. – marimba
Mel. – melody with accompaniment
vib. – vibraphone
W.F. – superposition of waveforms
xyl. – xylophone

With the Fig. 6.39, it is noticeable how Xenakis worked with vertical blocks of timbres (as it occurs in subsections A1, A2, B1, end of B2, B3, B6, and C) in opposition to more horizontal structures that are the result of progressive entries of timbres. Two types of block structures are also seen here: monotimbral structures and polytimbral structures. Monotimbral structures occur with the

«*Métaux*» (A1, A4 and B1) and «*Peaux*» (B1) excerpts. Polytimbral structures occur associating «*Métaux*» and «*Claviers*» (in A2), as well as «*Métaux*» and «*Peaux*» (in B5), and the three previous movements (in B2, B3, B4, B6 and C). To better visualize these structures, the Table 6-9 was created showing the relative and total proportions of presence of these materials all over the movement.

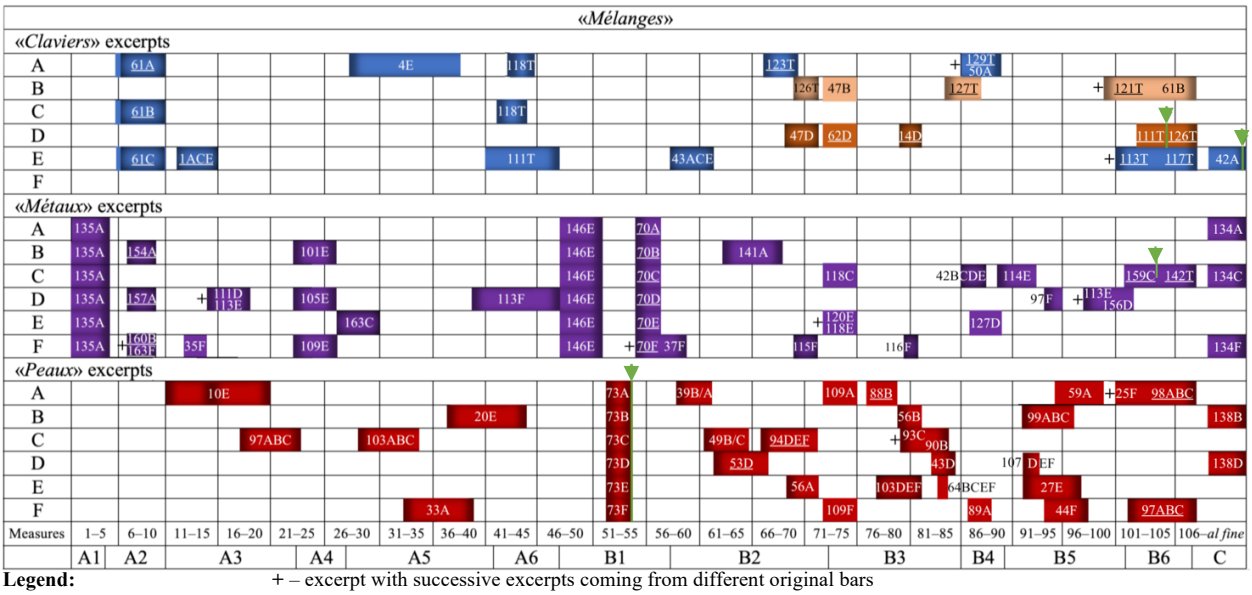
***Table 6-9***. Percentage of excerpts associated in simultaneous types of blocks or successive structures.

| Type of structure | | Number of measures (relativ %) | Percentage |
|---|---|---|---|
| **blocks** | **monotimbre** | 14 (36%) | (12,5%) |
| | **polytimbre** | 25 (64%) | (22%) |
| | **subtotal** | 39 | **34,5%** |
| **horizontal development** | | 74 | **65,5%** |
| | **total =** | **113** | **100%** |

The horizontal structures that are the result of concatenated entries of timbres are present in the greatest number of bars of the movement (65.5% of «*Mélanges*») and the vertical structures in the least number (34.5%) by consequence. Regarding block structures alone, 64% of bars occupied by them are polytimbral and 36% are monotimbral, as better visualized above.

### 6.4.2 Origin of the materials recapitulated

The specific provenance of each excerpt is shown in Fig. 6.40 which ultimately points to the different ways Xenakis reemployed the previous materials and the degree of freedom he allowed himself. It is evident that excerpts from specific voices were not restricted to the musicians who played them previously.




**Legend:** + – excerpt with successive excerpts coming from different original bars
**135A** – the number points the bar and the letter the original player (in this case, the excerpt comes from bar 135 voice A)
**118T** – excerpt coming from bar 118 and was originally a tutti in unison
**61A** – excerpt with changes coming from bar 61, voice A ▼ – excerpt with new material composed

***Figure 6.40***. Origin of each excerpt present in «*Mélanges*» and indication of materials not previously exposed.

The excerpts with new materials exclusive of «*Mélanges*» are rare, being restricted to very short passages (in B1, B6 and C). They must be considered more so as variations inside previous excerpts, as they lack innovative textures or completely different passages. While the main procedure in the movement was to modify the context of excerpts bringing new aural possibilities, this procedure is less consequential when new materials appear. Their presence occurs even inside previous excerpts and known materials, being even more incipient in the context of sections and subsections. They occur in short passages in «*Peaux*» (B1), «*Métaux*» (B6) and «*Claviers*» (B6 and C). In «*Peaux*», the new passage is extremely short, but also serves as the conclusion of the drum excerpt in B1 and being present in all the sextet in unison (Fig. 6.41a).

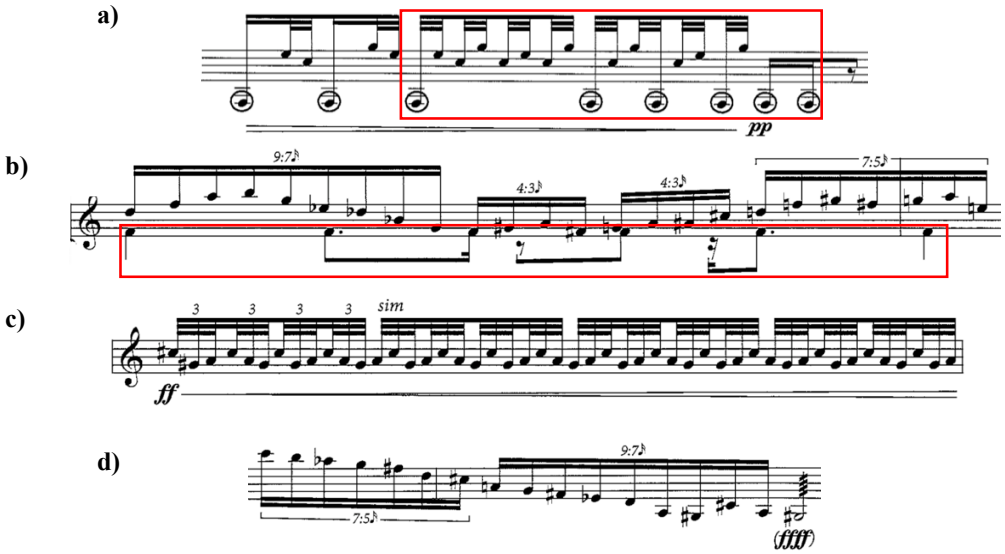



***Figure 6.41***. Excerpts from «*Mélanges*» with passages not presented in the previous movements. **a)** Meas. 54, players A, B, C, D, E and F. **b)** Meas. 103, player C. **c)** Meas. 105, player D. **d)** Meas. 111 and 112, player E – © Éd. Salabert.

For «*Métaux*», what occurs differently is the change of the bass note (Fig. 6.41b) but, because this partially new structure is present in a dense texture of tutti, it is hardly perceived as innovative in this context. The new passages for percussion keyboards refer eminently to the material of the last section of «*Claviers*» that is presented varied (Fig. 6.41c) and the mirroring of the motivic material of δ (Fig. 6.41d). These punctual renewing on the materials ultimately enter the entire perspective of micro-differentiation that Xenakis established for the work as a whole (see more about the unfaithful repetitions in Chapter 3–Subchapter 3.3.4). Since these passages are short and generally appear within the mass of other passages and voices, they result in being unnoticeable as innovative materials.

With regard to variations on previous structures in general, when the excerpts are analyzed more quantitatively (Table 6-10), it can be seen that «*Métaux*» provided the most quantity of original materials (39%), followed by «*Peaux*» (37%) and «*Claviers*» (24%). When analyzed separately, excerpts from «*Claviers*» show a significantly greater interest in metal keyboards (almost 70%) than

in wooden ones. Comparing the original and altered materials, 74% of the bars have not been modified at all and 26% have undergone some kind of change. The excerpts from «*Métaux*» suffered the least changes (18%), followed by «*Peaux*» (25%), while the excerpts from «*Claviers*» suffered the most changes (40%). However, considering only the excerpts from «*Claviers*», one notices that the wooden instruments (marimba and xylophone) are proportionally more altered (58%) than the vibraphones (31%).

***Table 6-10***. Percentage of material from the monotimbral movements in terms of modifications and relative dynamics in «*Mélanges*».

| **Original movement** | | **Number of measures used in «*Mélanges*»** | **Comparison of excerpts** | | **Dynamic characteristics (%)** | |
|---|---|---|---|---|---|---|
| | | | **similar measures** | **modified measures** | | |
| **«*Claviers*»** | **metal instruments** | 70 | 48 (69%) | 22 (31%) | *ffff, fff, ff, f, mf*<br>*cresc.*<br>*decresc.*<br>*mp, p, pp, ppp* | 35%<br>10%<br>13%<br>42% |
| | **wood instruments** | 33 | 14 (42%) | 19 (58%) | *ffff, fff, ff, f, mf*<br>*cresc.*<br>*decresc.*<br>*mp, p, pp, ppp* | 37,5%<br>25%<br>0<br>37,5% |
| | **Subtotal** | 103 (24%) | 62 (60%) | 41 (40%) | *ffff, fff, ff, f, mf*<br>*cresc.*<br>*decresc.*<br>*mp, p, pp, ppp* | 36%<br>17,5%<br>6,5%<br>40% |
| **«*Peaux*»** | | 158 (37%) | 118 (75%) | 40 (25%) | *ffff, fff, ff, f, mf*<br>*cresc.*<br>*decresc.*<br>*mp, p, pp, ppp* | 63%<br>17%<br>12%<br>8% |
| **«*Métaux*»** | | 164 (39%) | 134 (82%) | 30 (18%) | *ffff, fff, ff, f, mf*<br>*cresc.*<br>*decresc.*<br>*mp, p, pp, ppp* | 46%<br>20%<br>20%<br>14% |
| **Total** | | **425** | **314 (74%)** | **111 (26%)** | | |

In terms of employing dynamics for each type of timbre set, Xenakis used «*Peaux*» and «*Métaux*» proportionately in stronger nuances compared to «*Claviers*». For the two movements, the proportion between higher and lower dynamics is quite relevant while with excerpts from «*Claviers*», the composer balanced vibraphones, marimba and xylophone in the two extremes of dynamics types.

One realizes then how certain correlations between the timbres expose predominantly the timbre of SIX-XEN. Xenakis used more «*Métaux*» passages, a characteristic in ties with the fact that he altered them proportionally less, employing them with comparatively stronger dynamics. At the other end of the spectrum, he uses fewer passages from «*Claviers*», altering them proportionally more and with softer dynamics. This prominent use of the SIX-XEN throughout the movement will be from now specifically addressed.

### 6.4.3 The use of SIX-XEN: specificities and implications

To discuss specifically how Xenakis applied Sixxen in «*Mélanges*», the main passages in which its characteristics are used, the instruments with which it interacts and how it is treated will be highlighted here. To address these perspectives, it is firstly important to compare the excerpts specifically from two monotimbral movements and put in evidence that the excerpts coming from «*Claviers*» are intrinsically dependent of those coming from «*Métaux*». The association of SIX-XEN and excerpts from «*Claviers*» are clear, because there is no passage with vibraphone, marimba or xylophone that is not connected by a preceding, simultaneous or succeeding sonority of the Xenakian instrument (in Fig. 6.42, this is very clear in B2 and B3, e.g.). The connection created by the association of both is what structures the movement as whole.

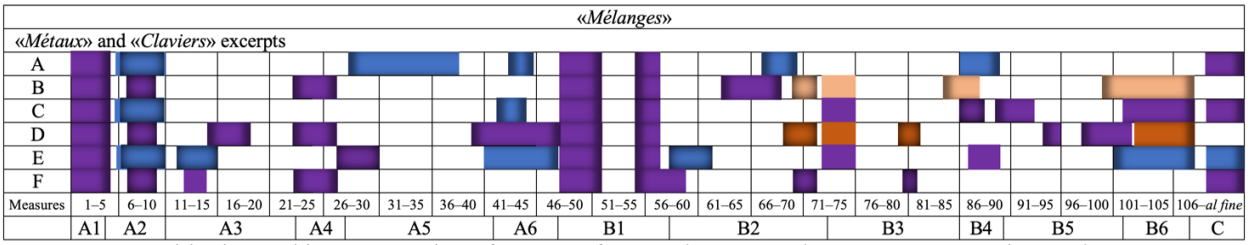



***Figure 6.42***. Positioning and interconnection of excerpts from «*Claviers*» and «*Métaux*» present in «*Mélanges*».

When comparing the interaction between the other movements (Fig. 6.43), it is perceptible that some excerpts have more independence than «*Claviers*». In this way, «*Peaux*» and «*Métaux*» contain numerous subsections with non-superposed excerpts (A1, A2, A4, A5, B1, and B3) as well as «*Claviers*» and «*Peaux*» (A2, A3, B1, B2, B3, B5).

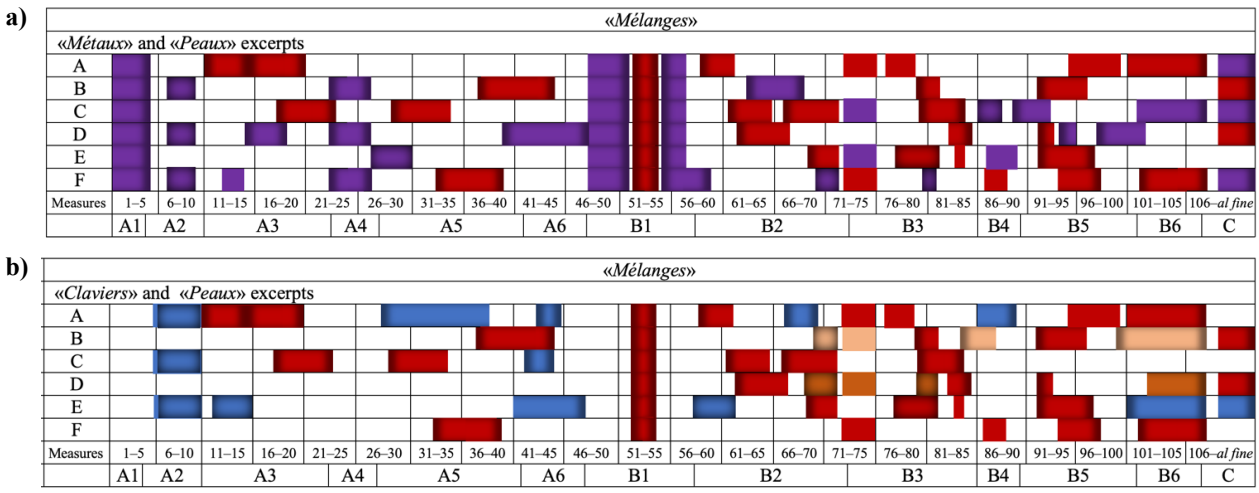



***Figure 6.43***. Positioning and interconnection of excerpts from «*Métaux*» and «*Peaux*» (**a**), as well as «*Claviers*» and «*Peaux*» (**b**) present during «*Mélanges*».

The emphasis on the Sixxen timbres in the movement overall is already clear by greater presence of «*Métaux*» passages in higher dynamics and with a lower proportion of modifications. Even the way the composer introduced the instrument throughout the movement reinforces the perception of this timbre as central. The SIX-XEN is the first instrument heard in the introduction of the movement (meas. 1-4), a dense unison subsection that arises from a phrase present only in player C at meas. 135 of «*Métaux*». This phrase is originally only part of a polyrhythmic texture in which its melodic contour passes practically unnoticed amidst the even denser texture. «*Mélanges*» thus begins practically as an extension of «*Métaux*», as a reminder of what constitutes the timbre of SIX-XEN and as an opening reassuring the continuity of its sonority while it already points to the new perspectives that are coming.

Immediately after the SIX-XEN introductory section, Xenakis introduces the metallic sonority coming from «*Claviers*» (trio of players ACE), as a kind of comparison between inharmonic metal with microtonal tuning and harmonic metal with equal temperament tuning. After a short section only with three vibraphones, he then superposes three sixxens as if, by promoting a meeting between the two categories, he would give the listeners all the possibilities to understand the metallic properties that will guide the movement. At the same time, a spectrum between noise and pitch metallic sounds creates a new sonority. The excerpt from «*Claviers*» chosen was carefully selected and rather characterizes the notes of the Indonesian pentatonic scale ("*pelog*") that are present within the sieve in Period 2 (P2). He thus directs the hearing to a pentatonic scale with numerous frequencies presenting beating effects (due to the presence of three sixxens) in a passage with only metallic instruments (Fig. 6.44).

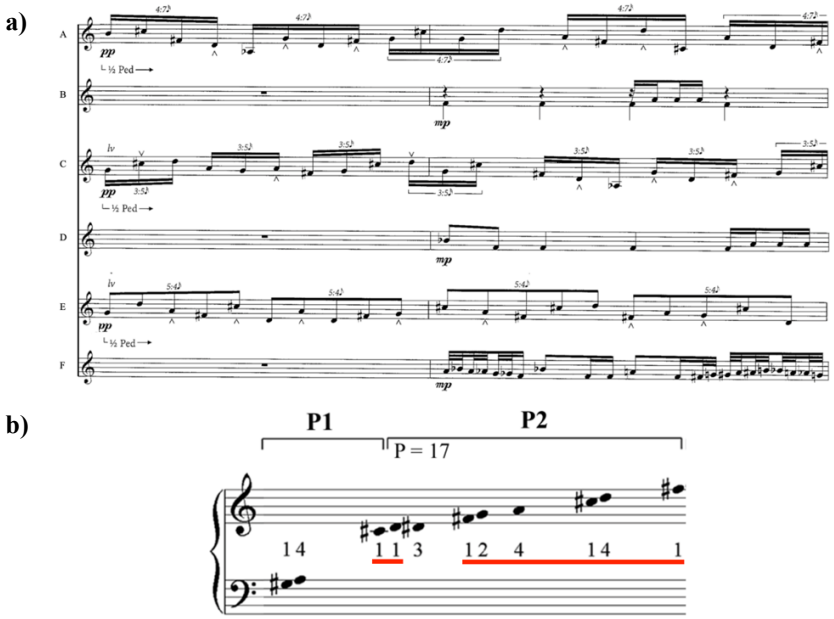



***Figure 6.44***. The first superposition in «*Mélanges*» of SIX-XEN and vibraphones (**a**) based on the "*pelog*" part of the sieve (**b**). **a)** Source: *Pléïades*, «*Mélanges*», meas. 6-7 (Xenakis, 2013) – © Éd. Salabert.

In this passage, his references to gamelan music and his trip to the country in 1972-1973 seems to find immense strength, being thus the gateway to even the movement. After this passage, the composer elaborates another dialogue between sixxen and the vibraphones (now with excerpts from his introduction) from meas. 12 and then from meas. 28.

The development of the SIX-XEN throughout the Section A includes even another entire subsection without overlapping other timbres (A4, meas. 24-27), of which is only granted to this type of timbre (as occurs with excerpts from «*Peaux*» during Section B but as a passage between subsections). To close Section A, he further promotes the encounter of a sixxen with the concluding excerpts coming from «*Claviers*» presented in this moment by the three vibraphones (Fig. 6.45). As previously indicated, these excerpts derive from a record of gamelan, highlighting the interest of Xenakis to integrate the SIX-XEN into a context in which the Indonesian traditions are indirectly present.

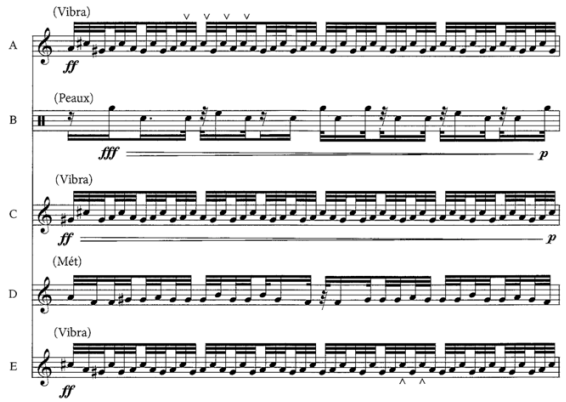



***Figure 6.45***. Superposition of excerpts with the SIX-XEN, vibraphones and drums during «*Mélanges*». Source: *Pléïades*, «*Mélanges*», meas. 44 (Xenakis, 2013) – © Éd. Salabert.

The beginning of Section B, which represents a certain transition within the whole movement, once again highlights the SIX-XEN. B1 starts and ends with a massive presence of this instrument. «*Peaux*» excerpts become an important conductive line in Section B (mainly from B4 on) but Xenakis still created intriguing dialogues between the metallic timbres of sixxen and vibraphones (as in meas. 58-59 and 67-70), and also sixxens and woods (meas. 70-75). The Subsection B4 presents interesting choices because excerpts from the end of «*Claviers*» are used again now with an interaction with a sixxen (player C) presenting a colotomic structure (Fig. 6.46). Once more, the choice of excerpts was intentionally biased by a gathering of materials with defined references on Indonesian music traditions.

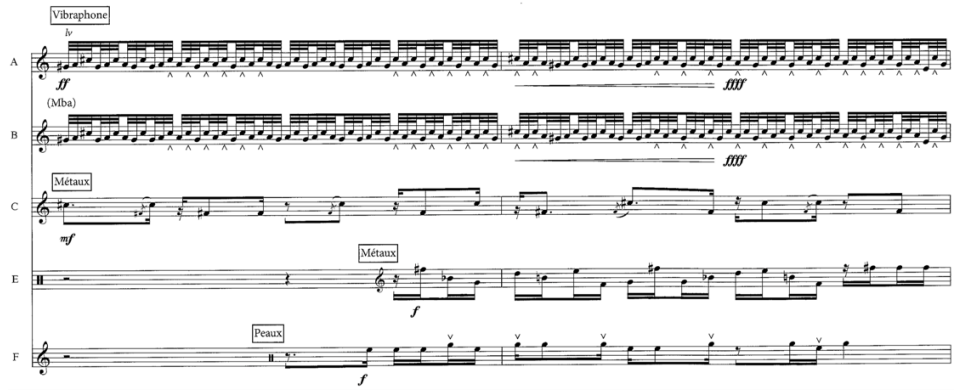



***Figure 6.46***. Superposition of excerpts coming from «*Claviers*», «*Métaux*» and «*Peaux*» during «*Mélanges*». Source: *Pléïades*, «*Mélanges*», meas. 86-87 (Xenakis, 2013) – © Éd. Salabert.

This constant superposition of timbres intensifies with the development of Section B and reaches its culminating point in B6. This subsection presents the greater diversity of timbres in the whole movement and an enormous density of materials. In this passage that precedes the concluding material, Xenakis gathered excerpts taken from the final sections of «*Métaux*» and «*Claviers*» (Fig. 6.47). Thus, one can notice the parallel use of these movements in «*Mélanges*», after all in the beginning and middle of Section A (A3 and A5) he uses initial excerpts from both movements and at the end of Section B he uses final excerpts from both.

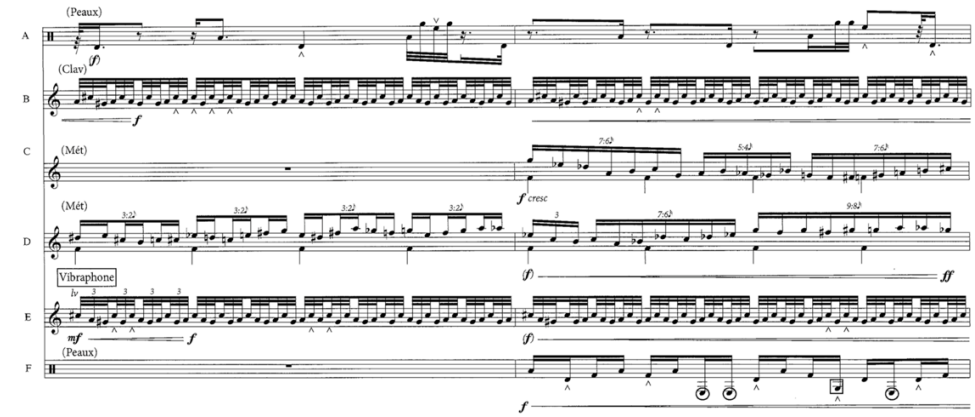



***Figure 6.47***. Passage of «*Mélanges*» gathering conclusive excerpts from «*Claviers*» and «*Métaux*». Source: *Pléïades*, «*Mélanges*», meas. 101-102 (Xenakis, 2013) – © Éd. Salabert.

The concluding section of «*Mélanges*» exposes once again the importance given to the SIX-XEN and its fundamental role during the movement's development. The excerpt of «*Métaux*» used to close «*Mélanges*» is correlated to the excerpt used to introduce it, making that the first four and the last six measures are directly and structurally connected. From the SIX-XEN, all «*Mélanges*» emerges, and to the same excerpt all the movement returns. All the variations created throughout its development, diversifying the materials to the maximum point, return to the initial material.

«*Mélanges*» is therefore a great extension of the SIX-XEN sonority; it is a movement created by Xenakis to, more than articulate his instrument with the others, show how it acquires a resignification by the interpenetration of other monotimbral movements.

In «*Mélanges*», the significance that the travel to Indonesia represented for Xenakis' production takes place. By how the different movements were gathered, by the Xenakian instrument itself, and by the numerous associations produced and choices prioritized, an entirely new dimension can be perceived. It brings impactful possibilities to the understanding of the piece, including not only its potential interpretative aspects but also to the entire works of the composer. Ultimately, the first impressions by the critiques after the premiere were accurate with published expressions such as "like a Balinese ritual call" (Michel, 1979) and "[it] echoes an Indonesia metamorphosed" (Thorgevsky, 1979).

One can summarize that he used practically all the previous timbres and instruments (exception made only to the xylomarimba that does not return at any moment in this movement), giving an evident emphasis to the SIX-XEN throughout the movement, but equally to the vibraphones in relation to the wooden percussion keyboards (marimba and xylophone) of «*Claviers*». Interesting points of contacts and a clear association between vibraphones and the SIX-XEN also emerge, putting in evidence the fact that Xenakis had a special interest on the metallic sonorities as a prominent force in the timbral properties of the movement in general. As shown here, each original movement was treated by Xenakis in a particular way and with a specific attention, something that allows «*Mélanges*» to present its own characteristics and a completely new structure; at the same time, it is coherent with what was or what will be exposed in the other movements, depending on the order that the performers chose to organize the four *Pléïades* movements.

With the clarification of the compositional structures in *Pléïades* and use of the SIX-XEN, it is important to directly address the correlations with Indonesian traditional aspects and to bring deeper perspectives to the present discussion. Some of these aspects emerged during the production of the present analysis, stimulating the focus on certain perspectives in a deeper context. In this sense, Chapter 7 will put in evidence a background rarely discussed and point out "details" about Xenakis' creative process that was not previously considered. These "details" are specified in quotation because they could intensively change the comprehension about an important part of his production. They can bring a new dimension about *Pléïades*, pointing to new perspectives for performance and stimulating an innovative comprehension about the composer's creative process.

# Chapter 7. Indonesia in *Pléïades* (1978)

*I want to tell you about something which has been very important for my evolution: my study of Javanese music, and of the scale called the pelog in particular*
Iannis Xenakis – 1989 (Varga, 1996, p. 144)

It is important to consider that the music produced by gongs and metallophones ensembles is not unique to Indonesia. There are many different ensembles, instruments and traditions with particular characteristics in different countries of the Southeastern Asia (for example, Cambodia, Myanmar, Philippines, and others). However, because Xenakis referred directly to Indonesian music in the score of *Pléïades*, it is crucial to understand in which context these elements integrate and connect a potential source of new approaches on Sixxen prototypes, repertoire and performance development. On many occasions, the composer had inferred about Bali and Java music, and for this reason, several aspects of both islands' gamelan ensembles will be broadly discussed below[1], therefore establishing the main connections to the percussion sextet and Xenakis' instrument.

References specifically addressing aspects of the traditional music in the composer's work are generally more oriented towards the connections with Indian or Japanese music. A discussion about Indian musical aspects that changed Xenakis' thinking and practical approaches can be found in Solomos (1996), Harley (2004), Mâche (2009), Barthel-Calvet (2013), Declercq (2022) and Xenakis (2022). Mentions about contacts with Japanese culture can be found in Matossian (1981), Harley (2004), Solomos (2008b), Gibson (2011), and Sheppard (2019) among others. In a different perspective, Galliano (2002) discussed the Xenakian influence on Japanese composers and the avant-garde Japanese musical environment. The composer himself mentioned the fact that he was touched by Indian and Japanese music in different interviews[2]. He also referenced these aspects in his texts, as mentioning Northern Indian music elements in "*Vers une Métamusique*" (Xenakis, 1967).

Even if the composer mentioned Indonesian music in different interviews[3], the aspects of the presence of these traditional performative arts in Xenakis' thinking and compositional practices are not deeply discussed and exclusively addressed, with Lacroix (2001) being a rare exception that

[1] Even if many characteristics seems to dissociate both islands, it is important to perceive that there is a common ground and an interconnected historic process between both their musical practices. As McPhee specifies: "The difference between the music of Java and Bali is striking. With essentially the same instruments, scale systems, basic musical forms, and orchestral methods, each island produces its own style of music differing from the other in mood and color as night from day. A mystic, perfumed atmosphere surrounds the Javanese gamelan, whose soft, shockless resonance has been refined to the ultimate degree of perfection. In strong contrast the Balinese gamelan stands out dramatically in its hard, metallic vitality and the almost feverish intensity with which the newer music is performed." (McPhee, 1966, p. 4).
[2] As stated during an interview with Bálint András Varga: "I studied Indian percussion music a long time ago – not to imitate it but to understand the underlying principle, these shifts of rhythm which produce a multilayered system even on a single instrument." (Varga, 1996, p. 147).
[3] As it is the case in interviews with Restagno (1988), Varga (1996), Delalande (1997), and Serrou (2003).

addresses the subject in a more profound way. Thus, the subject still deserves a more direct and deep approach, with the development of more data and perspectives.

In the present text, Chapter 1 addressed the different aspects of Xenakis' life and his contacts with Indonesian culture. It addressed the potential first hearings and the context of this period, including the possible contacts that occurred during his studies and exchanges throughout his career, including the trip to Indonesia in 1972-1973. Chapter 2, even with greater focus on the premieres of *Pléïades* (1978), exposed the impression of the choreographer and journalists about the music. It addressed the statements in the dance libretto, the program notes of *Le Concile Musical* and Lille Festival, some journal critiques and magazine reviews just after the first performances highlighting the immediate correlation that the piece and the new instrument would stimulate and associate with performative arts from the Southeastern archipelago. Chapters 5 and 6 addressed the analysis of *Pléïades* by exposing its main characteristics tied to the SIX-XEN, and also emphasized compositional approaches that has direct connections with Indonesian musical traditions.

With the previous elements presented, it is important now to expand upon correlations that can be established between *Pléïades*, the SIX-XEN and Indonesian music practices. As it will be here addressed, these potential bridges are not constructed just by analogy, metaphors, allusions, poetic license or indirect association; rather, they are intrinsically connected and directly tied. To prove these aspects, the «*Métaux*» and «*Claviers*» movements will be the main focus of the topic, with considerations about «*Mélanges*». Thus, to discuss the production that is consequential of the 1972 travel to Indonesia, the main focus is *Pléïades* but different pieces are discussed in a broad approach to show how those perspectives mark a greater period of Xenakis' production. The pieces are accompanied by his statements and descriptions in order to reinforce certain Indonesian inputs and to show the conscious attitude that characterized his approach.

The present chapter is divided in seven subchapters, pointing to two direct connections between *Pléïades* and Indonesian music, along five others that could be inferred by analogy. The direct ties will be presented showing how a part of the pitch collection presented in «*Claviers*» and «*Mélanges*» has its origin in the trip to Indonesia made by Xenakis, and how the conclusive section of «*Claviers*» could be associated with a specific gamelan music that the composer had in a recording from 1951. The indirect ties will address broader aspects comparing gamelan and SIX-XEN (as the metallic characteristics, attack properties, the internal tuning properties of sets), the instrumentation and the work on timbres in *Pléïades* and other pieces searching for an Indonesian sonority, as well as the spatial disposition of the instruments.

## 7.1 The *pelog* in the sieve: a musical return to Northern Bali

There are direct connections between *Jonchaies* (1977) and *Pléïades* (1978), as well as direct implications between both and Indonesian performative arts. Considering the process timeline, *Jonchaies* was the first to have direct implications of the Indonesian trip in 1972-1973. As Xenakis initially addressed about the organization of pitches in the introduction of *Jonchaies*:

> The beginning of *Jonchaies* deals with pitch "sieves" (scales) in a new way and uses a special non-octaviating scale, one possible solution to the problems of outside-time structures. The, further on, they treat in-time "sieves" by multiplicities of timbre classes on several levels, played by subgroups of the orchestra, thus determining the levels of intertwining trajectories.[4] (Xenakis, 1977, p. i).

About this sieve that was used in "a new way", the composer still highlighted in a later 1989 interview that "There's a scale at the beginning of *Jonchaies,* which is very close to the *pelog*. It's treated there in a way that is my invention: instead of having one line, there are many lines, but all in the same range using the same scales. It makes a kind of flux, or vapour, of music." (Varga, 1996, pp. 164-165).

The insertion of this *pelog* scale in Xenakis' material was evidently noticed by his fellow composers. Philippe Manoury (interview by author, 2019) and François-Bernard Mâche (interview by author, 2020) both commented on this insertion, with the later stating: "This is very clear in *Jonchaies* where there is really a *pelog* mode, that is to say with five intervals in the octave but unequal intervals. So, some passages of *Jonchaies* sound abruptly Indonesian indeed."[5] This was also very perceptible for Betsy Jolas who traveled with Xenakis to Indonesia, and both had even noted the connection between the orchestral piece and the 1972 journey. As she explained:

> With Iannis, when I heard *Jonchaies*, I said to myself: well, this is what he got out of there [from that trip to Indonesia]. You know Iannis and I have known each other since 1951 [...] I have always followed his work [...] You can hear [in *Jonchaies*] from the beginning a melody that is Balinese, I think he must have notated it from there, in fact, it is almost a quotation. It appears and sneaks into the orchestra, it's a magnificent effect. [...] I must say that, <u>when I heard *Jonchaies*, I said to him: 'it seems to me that I have already heard that...' There was this side of 'I know where it comes from' and he said to me: 'you are not wrong!'</u> [underline added][6] (Jolas, personal communication, 2021).

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[4] As the composer originally wrote in French: "Le début de *Jonchaies* traite des « cribles » (échelles) de hauteurs d'une façon nouvelle et emploie une échelle non-octaviante spéciale, solution possible aux problèmes des structures hors-temps. Puis, plus loin, elles traitent des « cribles » du temps à l'aide de multiplicités de classes de timbres sur plusieurs niveaux, jouées par des sous-groupes de l'orchestre, et déterminant ainsi des plans de trajectoires qui s'enchevêtrent." (Xenakis, 1977, p. i).

[5] "C'est très net ça dans *Jonchaies* où il y a vraiment un mode *pelog*, c'est à dire avec cinq intervalles dans l'octave mais des intervalles inégaux. Donc ça sonne brusquement Indonésien en effet certains passages de *Jonchaies*." (Mâche, interview by author, 2020).

[6] "Chez Iannis, quand j'ai entendu *Jonchaies*, je me suis dit : ben voilà ce qu'il a sortie de là [de ce voyage en Indonésie.] Vous savez Iannis et moi on se connait depuis 1951 […] J'ai toujours suivi son œuvre […] On entend [en *Jonchaies*] dès le début se former une mélodie qui est balinaise, je pense qu'il a dû la notée de là-bas, en fait c'est presque une citation.

This direct mention of a *pelog* scale in the interior of the sieve is significant and has direct connections with original Indonesian music elements. It was not just a metaphor or the use of a stylized element captured in a theoretical book or similar; at the opposite, it was a pitch sequence that Xenakis himself collected during his trip and saved among his personal belongings for decades. It is thus perceptible in Xenakis' sketches and documents that this specific *pelog* scale primarily appeared during his trip to Indonesia in 1972-1973, where this would be recorded and was later reused by the composer (Fig. 7.1).

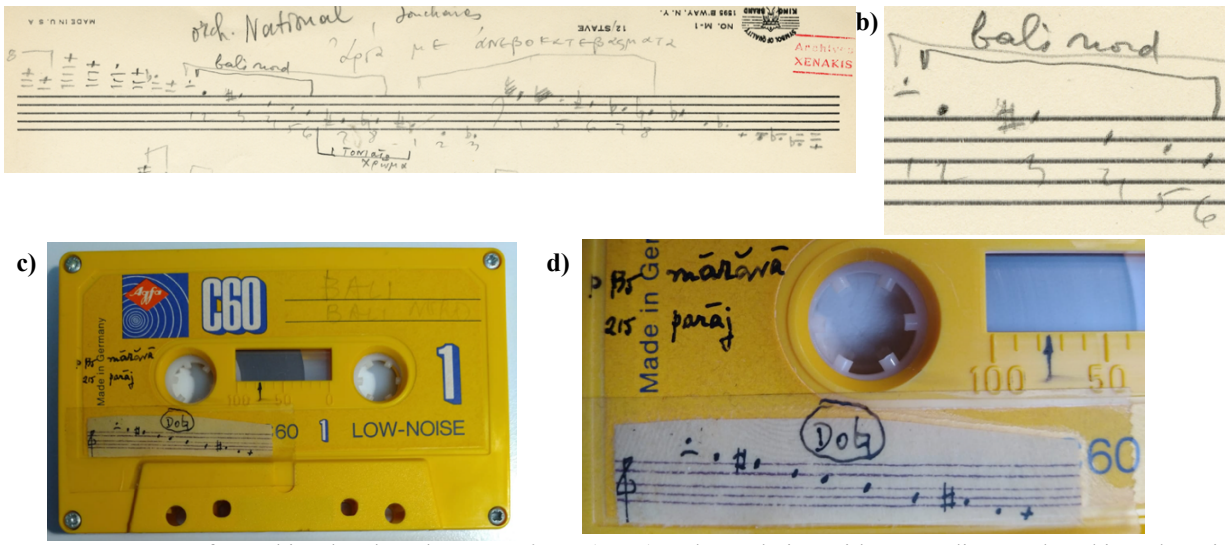


***Figure 7.1***. Excerpt of Xenakis' sketches about *Jonchaies* (1977) and correlation with a recording produced in Indonesia in 1972. **a)** Upper part of a page with elaboration of scales and groups of notes that would base the *Jonchaies* sieve. **b)** Detail of a) indicating the specific mention "bali nord". Source of both: © Famille I Xenakis DR (OM 26-7, p. 6). **c)** Tape called "Bali Nord", with a scale from a local gamelan. **d)** Detail of c). Source: BnF (DONAUD 0602 753–Xenakis 800).

His personal archives attest that, during the composition of *Jonchaies* at the origin of the sieve constitution, when Xenakis was still trying some sequencies of pitches, choosing intervals, and establishing initial materials (Fig. 7.1a and b), he intrinsically incorporated the exact same scale that he had heard in the Northern Bali and noted on the tape DONAUD 0602 753–Xenakis 800[7] (Fig. 7.1c and d). With the specific mention in the middle of the sieve "Bali nord" (Fig. 7.1b) – the same name that he gave to the tape (Fig. 7.1c) – he used the exact pitches previously transcribed, making clear that he was literally referring to previous documents and consulting old recordings to produce new materials.

Elle apparaît et elle se faufile dans l'orchestre, c'est magnifique comme effet ça. [...] Moi je dois dire que, quand j'ai entendu *Jonchaies*, je lui ai dit : 'il me semble que j'ai entendu ça déjà…' Il y avait ce côté de 'je sais d'où ça vient' et il m'a dit : 't'as pas tort !' [underline added]" (Jolas, personal communication, 2021).

[7] For more details about this recording and the trip, see Chapter 1–Subchapter 1.2.

The material initially experimented (Fig. 7.1a) is not identical to the final version that determined the established sieve that is presented one octave higher, but the excerpt from Northern Bali was important at the origin of the sieve and is fundamental in its characterization. This specific *pelog* structure introduced in the interior of the sieve is a complete hemitonic pentatonic scale recurrently present in the different periods of the sieve (P1, P2, P3, and partially in P4, as indicated in Fig. 7.2).

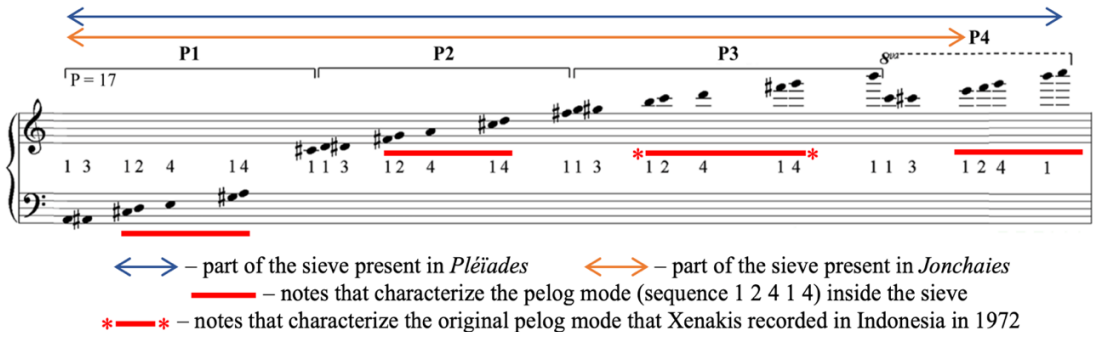


***Figure 7.2***. Sieve used at the beginning of *Jonchaies* (1977) and once again in *Pléïades* (1978) and the recurrent manifestation of a hemitonic pentatonic scale called by Xenakis as "*pelog*".

The original sequence of notes of the tape DONAUD 0602 753–Xenakis 800 is presented with an alteration of register, being one octave higher in the final sieve as part of the intervallic succession P3. This intervallic succession P3 could thus be considered the original of the sieve, with the others being consequence of this specific succession and its direct correlation with previous Indonesian materials. It is this complete sieve that finally establishes the beginning of *Jonchaies*, being the same sieve expanded and used once again in *Pléïades* (considering «*Claviers*» and «*Mélanges*»). Xenakis was clearly aware of the use of this scale inside the sieve, as he mentioned:

> In Javanese music, I was struck by the pelog mode, which consists of overlapping and interlocking two tetrachords through the play of sensitives. In this Javanese mode there are in fact two sensitives, one per tetrachord. For example, C-B-G-F sharp, where you have between C and G a first tetrachord and between B and F sharp a second one with B acting as sensitive on C and F sharp on G. Also, between C and F sharp you have an excess fourth, which is a tritone. In my opinion this pelog mode, with its two sensitives, represents a formidable knot on the expressive level. There are in fact enveloped within it two fourths, a tritone and two sensitives, an infinity of expressive virtues, then.[8] (Restagno, 1988, p. 44).

When asked if he did hear this mode through the performance of a gamelan orchestra, he answered:

[8] "Nella musica giavanese mi ha colpito il modo pelog, che consiste nel sovrapporre e incastrare due tetracordi attraverso il gioco delle sensibili. In questo modo giavanese ci sono infatti due sensibili, una per tetracordo. Per esempio Do-Si-Sol-Fa diesis, dove tu hai tra Do e Sol un primo tetracordo e fra Si e Fa diesis un secondo con il Si che agisce da sensibile sul Do ed il Fa diesis sul Sol. Inoltre tra Do e Fa diesis hai una quarta eccedente, ovvero un tritono. Secondo me questo modo pelog, con le sue due sensibili, rappresenta un nodo formidabile sul piano espressivo. Vi sono infatti avviluppate dentro due quarte, un tritono e due sensibili, un'infinità di virtualità espressive, quindi." (Restagno, 1988, p. 44).

> Yes, there were also singers and the music was performed in the sultan's palace. It was a court music.[9] What interested me most, however, was to find that the fourth is a kind of universal interval. [...] It plays a basic role in Western music because it defines the range of two disjointed tetrachords (C-F, G-C) but you also find it in Hindu music, Arabic music and Japanese music of the Nō, which is also based on two fourths. These kinds of observations led me to reflect at length on the real issue, which for me is that of scales. Indeed, the discussion of musical scales in different cultures allows us to see things a little more clearly when we try to construct different scales. Under what conditions can a scale be interesting? If it is periodic, we have the simplest condition; with an aperiodic scale the interest increases, because a given melody transposed into another register already results partially modified, and the same thing would happen with chords. One would thus have something like constant variation and tension. In inventing a scale, one must therefore calculate the succession of intervals, and this again raises the problem of symmetries. I do not mean by this that the scale should be symmetrical–then you would have a fall in tension and interest–I would say that it should be pseudoperiodic.[10] [underline added] (Restagno, 1988, pp. 44-45).

The term adopted for this Indonesian scale is hemitonic pentatonic because the term "*pelog*" used by Xenakis refers to a much more detailed and varied system of classification when discussed in terms of traditional concepts in Indonesia culture. It is impossible to reduce all the diversity of scalar material in gamelan music to one or several scales. In a broader way with general terms, it is possible to perceive types of scales with four, five, and seven notes, but there are numerous names and designations, systems of classification, and variants in the Indonesian perspectives. The term *pelog* originally referred to a seven-notes mode, being later adopted by many groups in a form with five notes as some intervals of the heptatonic were discarded. As better specified by McPhee (1966, p. 37):

> *Pélog* may be defined as a seven-tone quasi-diatonic scale which is less of an actual scale than an instrumental system for the forming of different five-tone modal scales within the seven-tone scale. These five-tone *pélog* scales are characterized by their intervals of unequal size, and change in interval relation with each transposition of the five-tone series. *Sléndro* is an entirely different system, a completely different tonality, perhaps the result of a more sophisticated idea of instrumental tuning. It is essentially a pentatonic scale, with intervals tending toward a uniformity of size. Whereas in *pélog* distinguishable seconds and thirds occur, in *sléndro* the octave is divided more equidistantly.

[9] Strangely Xenakis seems to refer to another recording here, the tape archived as DONAUD 0602 1053–Xenakis 920 at the BnF. This tape produced in Yogyakarta was effectively recorded during performances at the Kraton Ngayogyakarta Hadiningrat at the palace of the reigning Sultan of Yogyakarta and his family. This tape also presents scales (a *pelog* and a *slendro*) noted on (see more details in Chapter 1–Section 1.2.1) but they seem to have no relation with *Jonchaies*.

[10] "*E questo modo l'hai ascoltato attraverso l'esecuzione di un'orchestra gamelan?* / Si, c'erano anche dei cantanti e la musica si eseguiva nel palazzo del sultano. Era una musica di corte. Quello che mi ha interessato maggiormente è stato però constatare che la quarta è una specie di intervallo universale. [...] Essa ha un ruolo basilare nella musica occidentale perché definisce l'ambito di due tetracordi disgiunti (Do-Fa, Sol-Do) ma la ritrovi anche nella musica indù, in quella araba e nella musica giapponese del Nō, che si fonda anch'essa su due quarte. Questo tipo di osservazioni mi ha portato a riflettere a lungo sul vero problema che è per me quello delle scale. La discussione sulle scale musicali delle diverse culture ci permette infatti di vedere le cose un po' più chiaramente quando cerchiamo di costruire delle scale diverse. A quali condizioni una scala può essere interessante? Se è periodica abbiamo la condizione più semplice; con una scala aperiodica l'interesse aumenta, perché una data melodia trasposta in un altro registro risulta già parzialmente modificata e la stessa cosa accadrebbe con gli accordi. Si avrebbe in questo modo qualcosa come una variazione e una tensione costanti. Nell'inventare una scala bisogna calcolare quindi la successione degli intervalli, e questo ripropone ancora una volta il problema delle simmetrie. Non voglio dire con questo che la scala deve essere simmetrica - in questo caso si avrebbe caduta di tensione e di interesse - direi che dovrebbe essere pseudoperiodica." (Restagno, 1988, pp. 44-45).

But even those terms are extremely variable depending on region, and could address a spectrum of tuning and pitch collections. As Tenzer (2011, p. 36) affirms: “Rather than think[ing] of Balinese tunings as scales, it is perhaps helpful to conceive of them as a set of guidelines for intervals (distance relationship between tones). This idea is flexibly interpreted by tuners, giving rise to the variety of tunings found in actual practice.” He explains then that *pelog* and *slendro* are a sort of two sets of existing guidelines, commonly known by those names in Bali and Java.

One must not consider the scale called *pelog* by Xenakis as representative of the entire Indonesian musical culture, even in terms of either Balinese or Javanese music. Because Xenakis noted a scale of a specific gamelan that he heard and recorded during the 1972-1973 trip, it is certain that the name has a significant importance for him because he reused this material several years later. He was therefore attributing meaning to this scale as a sort of generic scale that could provide sonorities similar to the gamelan music and that could provide different harmonic and timbral material, as the composer would point out in many occasions. The aspect of a scale and its applications tied to the sieve theory that interested Xenakis is how it could influence the force correlation, directionality, tensions and timber changes. As he affirmed during a 1989 interview with Varga (1996, p. 144-145):

> The power of the scale itself should suffice to make the music interesting. If it isn’t. I’ve failed.
> I want to tell you about something which has been very important for my evolution: my study of Javanese music, and of the scale called the pelog in particular, which is based on a very powerful interlocking of two fourths.
> The perfect fourth has universal currency – in India, Africa, Europe, China, Japan. Nobody knows why. I give no credence to the explanation based on an arithmetic approach, the harmonic analysis which links the interval to the very simple frequency ratio. After all, the octave is even simpler, and ought to be even more universal, which it is not. It was to emerge much later.
> In the pelog the two fourths are interlocked in such a way as to produce leading notes. For instance, you have G and C going up, and F sharp and B going up. The B is a leading note to C and the F sharp is a kind of leading note to G. At the same time the C and F sharp also make a tritone. This powerful melodic structure is the core of Javanese music, and also in a way of Balinese music.
> I have linked the pelog to the ancient European tradition of the tetrachord – and indeed to Aristoxenos and Euclid who both regarded the fourth as the most important constituent of the scale.
> The white-key scale on the piano is based on two fourths divided by one tone: C to F, then you jump a tone and go from G to C. These two fourths are exactly identical in structure.

Here, Xenakis may have shown another point in which he based his beliefs on common aspects between extra-European and Greek music. The statement also reinforced that the composer studied, analyzed, and read about the context of the *pelog* scale. In the same interview, Xenakis justified why he used the *pelog* as part of the sieve while he specified that a sieve does not represent an imitation of different scales, but rather a tool to precisely and dynamically work with intervallic and pitch collections. The main aspect relates to how to bring tension to the structures and how to coordinate

the whole intervallic space of the musical tissue through intervallic progressions or through "jumps". As Xenakis described:

> I gave the example of the *pelog* to show how the issue of tension needs to be kept in mind in constructing a scale. I didn't intend to say one should imitate any particular one. Tension is important for the melodic patterns, the chords, and for the flow of the music itself. In chromatic and well-tempered scales, you can generate tension only through jumps, as in serial music. When the notes are closer to each other, as in the chromatic scale, you lose tension, unless you apply a kind of sieve locally – that is, you choose intervals that produce some tension. (Varga, 1996, pp. 145-146).

As consequence of the interaction with *in situ* aspects of the Indonesian music, this material returned in other opportunities as Xenakis himself mentioned: "In *Aïs* I modified this scale slightly in order to make it less recognizable, to be different and yet retain a kind of specific tension" (Varga, 1996, p. 165). It is in this context that a major panorama of Xenakis' production could be included in the discussion. This sieve and variants created by transposition, derivation, and in combination with other sieves were recurrently present in the 1970s and 1980s, with later appearances in the 1990s. For example, the sieve is main pitch collection used in *Palimpsest* (1979, for large ensemble), *Anemoessa* (1979, for mixed choir and orchestra), *Aïs* (1980, for baritone, percussion and orchestra), as well as in transposed versions of *Kyania* (1990, for orchestra) and in *Roaï* (1991, for orchestra), among others as presented and further addressed by Exarchos (2007). This particular sieve was therefore adopted as an important compositional tool and specific research addressing a large and comparative perspective.

## 7.2 «*Claviers*» and the resonances of "one of the most beautiful pieces I've ever heard"

Numerous composers presented some of their compositional choices in terms of strict musical parameters as the result of the contact with Indonesian music. The aspects they point out as being derived from listening to gamelan music are aspects of register and tessitura, choice of timbre, temporal and rhythmic changes, and others. Messiaen declared during an interview with Samuel (1986, p. 124) that:

> I believe that I was one of the first to use simultaneously the extreme high and the extreme low of the keyboard, not only for effects of softness but for effects of force and contrast. I even combined, in my *Vingt regards* [*sur l'Enfant-Jésus* (1944)], the accelerando and the rallentando, it is an extremely rare effect which hardly exists except in Bali: one finds it in the *Regard de l'onction terrible*.[11]

[11] "Je crois avoir, un des premiers, utilisé simultanément l'extrême aigu et l'extrême grave du clavier, pas seulement pour des effets de douceur mais pour des effets de force et de contrastes. J'ai même combiné, dans mes *Vingt regards*, l'accelerando et le rallentando, c'est un effet excessivement rare qui n'existe guère qu'à Bali : on le trouve dans le *Regard de l'onction terrible*." (Samuel, 1986, p. 124).

In another example, Betsy Jolas stated that the unexpected, sudden and very precise changes of speed were captivating when hearing gamelan music during the trip she made with Xenakis to Indonesia. As she stated:

> I was very fascinated by the improvisational aspect and, at the same time, who was not?! Because it was according to very strict rules, that I discovered afterwards. But most of all, I was fascinated by the way it was going fast all of a sudden, it was very slow and then all of a sudden it was going fast and it was getting feverish... And in my pieces, I wanted to see how you could do that. That impressed me a lot and I also reproduced in the low register of the piano what the gongs do in a gamelan, that is to say that they punctuate the phrases and that I tried to reproduce. I was very impressed by this effect. And just recently I had to do with a string quartet where I was evoking a drama that we saw [in Indonesia].[12] (Jolas, interview by author, 2021).

The musical parameters shaped differently by these composers as consequence of the contact and listening of Indonesian music are clear. In the case of Xenakis, the situation had different contours and nuances. As presented in Chapter 1, Xenakis affirmed during a 1973 radio interview[13] that "one of the most beautiful pieces" he had ever heard was a gamelan piece that he would have heard at least 20 years before at the beginning of the 1950s (see specifically Chapter 1–Section 1.1.1). As presented, the 1951 record saved at the BnF as DONAUD 0602 218–Xenakis 223 coincides with the period and is likely to be related to the music he mentioned. Hearing this tape at the BnF, a direct correlation with the «*Claviers*» movement emerged. Both materials depict a parallel, showing that Xenakis would have again consulted previous Indonesian materials to creatively stimulate his compositions. A link is indicated (Fig. 7.3) to access the excerpts from the original Balinese gamelan piece present in the tape DONAUD 0602 218–Xenakis 223 and a recording of *Pléïades*.

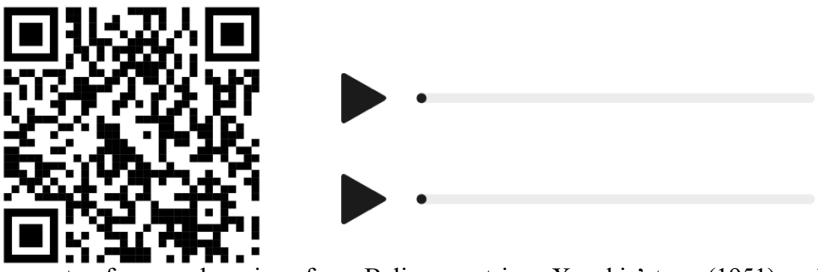

***Figure 7.3***. Link to excerpts of a gamelan piece from Bali present in a Xenakis' tape (1951) and part of «*Claviers*» conclusive section. Please use the QR code or the link www.ronangil.com/doctorate-bali-claviers-recordings.

[12] "J'étais très fascinée par le coté improvisateur et, en même temps, qui ne l'était pas ?! Parce que c'était selon des règles extrêmement strictes, ça j'ai découvert après. Mais surtout j'étais fascinée par la manière dont ça partait en vitesse tout d'un coup, c'était très lent et puis tout d'un coup ça partait en flèche et ça devenait fiévreux… Et dans mes pièces j'ai voulu voir comment on pourrait faire ça. Ça, ça m'a beaucoup impressionnée et j'ai aussi reproduit dans le grave du piano ce que font les gongs dans un gamelan, c'est à dire qu'ils ponctuent les phrases et ça j'ai essayé de le reproduire. J'étais très impressionnée par cet effet. Et tout récemment j'ai eu à faire avec un quatuor à cordes où j'évoquais un théâtre que nous avons vu." (Jolas, interview by author, 2021).

[13] The interview (Xenakis, 1973) occurred in a radio program turned just after his return from Indonesia and had also the presence of François-Bernard Mâche. It was produced because of this trip and to have his returns and observations about the country and the local culture.

The correlation emerges from rhythmic patterns, pitches, and a sound globality that are perceptibly and demonstrably similar. The concluding section in «*Claviers*» (from meas. 111) presents the only unison that occurs between metallic (three vibraphones) and wooden instruments (marimba, xylophone, and xylomarimba), characterizing a tremendous change in the general texture (Fig. 7.4). This passage even presents a different use of the original sieve, with the break of the specific octave of the intervallic succession P1. This means that Xenakis used the pitches that would be characteristic of P1 but one octave higher, where others should be characteristic as specific pitches of the intervallic succession P2. The change in the logical sequence determined by the sieve and the abrupt modification of the texture breaks a previous expectation and brings the section into focus with surprising ending. Here it is evident that more than changing expectations, Xenakis is directly quoting the gamelan recording he acquired in 1951 and kept in his collection for nearly three decades, using it in 1978 specifically in this percussion piece.

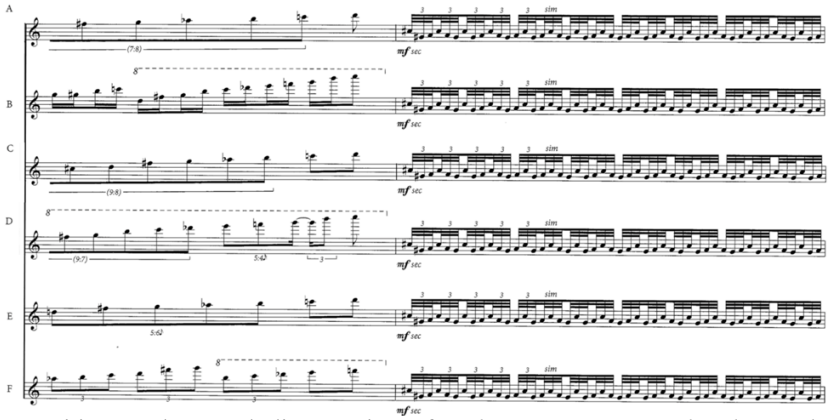

***Figure 7.4***. Abrupt transition to the concluding section of «*Claviers*». Source: *Pléïades*, «*Claviers*», meas. 110-1 (Xenakis, 2013) – © Éd. Salabert.

Even if in this case the material was initially elaborated for *Pléïades*, the composer would subsequently reuse this material. This specific texture interested Xenakis so strongly that he would imply it for future pieces. In this perspective, *Komboï* (1981), a duo for harpsichord and percussion, features material with certain similarities. The instrumentation has radically been changed but the excerpt (starting on meas. 240) highlights a correlated treatment of texture, pitches, accents, melodic ostinato, and rhythmic elements (Fig. 7.5).

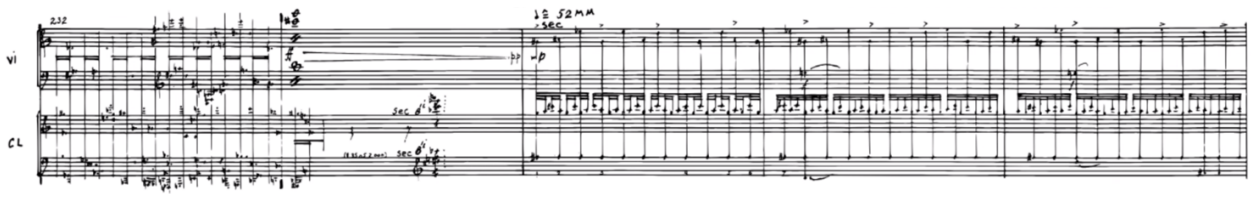

***Figure 7.5***. Excerpt of *Komboï* (1981) that presents the same material composed for the concluding section of «*Claviers*» (from measure 111). Source: *Komboï*, meas. 232-251 (Xenakis, 1981) – © Éd. Salabert.

The insertion of a specific scale recorded in Bali in 1972 and the use of a texture heard in a gamelan recording in 1951 are crucial in Xenakis' production here addressed. Exogenous materials were rarely found in his works. Because of this, more considerations about *Pléïades* as a piece with correlations to gamelan and Southeastern Asian music could be addressed.

## 7.3 The *kotekan* in «*Métaux*» and «*Claviers*»

A very important element in the characterization of the Indonesian music is the *kotekan*. This structure is the result of different melodic lines (generally two in Balinese music) that are complementary in their development, intricately connected in terms of their rhythmical development and directly correlated by their sequences of pitches (Fig. 7.6).

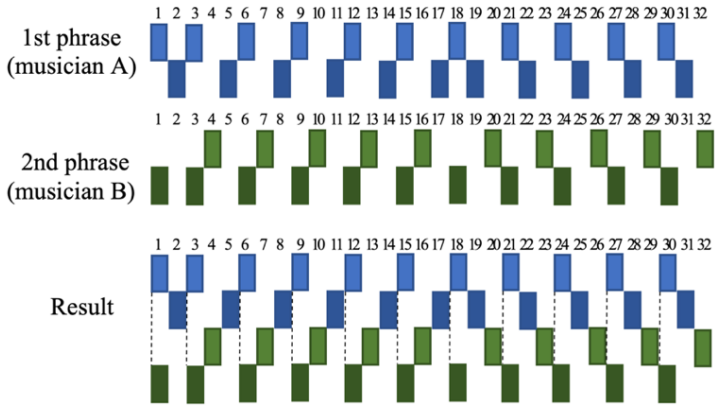


***Figure 7.6***. Graphic representation of a typical *kotekan*, melody resulting of two interlocked parts. Representation with thirty-two notes based on Spiller (2004).

The result is perceived as a unique melody but in its core, there are at least two musicians responsible for the integration of these typical interlocking parts[14]. As seen in the example above and as Spiller (2004, pp. 121-122) stated, "various colotomic instruments in gamelan ensembles play parts that may be said to be complementary to one another because each part plays during the silences in the other parts so that the ear and brain are compelled to hear them as a single musical entity." In his statement, it is also necessary to consider the importance of the colotomy and by consequence, the colotomic instruments, structures, and forms. The colotomy is characterized by the subdivision of time in smaller structures punctuated by specific instruments that could help to stabilize the gamelan ensemble while it allows a clear dimensioning of the complete form, its subdivisions, changes and different parts. The colotomic structures, being generally cyclic and repetitive, are important

[14] Generally, this structure of two melodic lines is presented by many musicians for each one of the parts, requiring a very precise coordination of the tutti and skillful musicians.

references while performing in gamelan ensembles, helping the musicians to perceive the lengths and changes tied to a specific section or the many transitional passages that occur throughout a piece[15].

When specifically addressing the Balinese music, Tenzer (2011) pointed out that the instruments in the upper register are likely to be used to produce the *kotekan*. As he stated: "The busy upper registers of the gamelan are the domain of the gangsa and reyong. These instruments spin out *kotekan*, the crackling ornamental fireworks of the Balinese music." (Tenzer, 2011, p. 54). This is precisely what Xenakis highlighted when characterizing the Subsection B1 of «*Métaux*». There, some structures have clear correlations with the *kotekan* (due to interlocking parts) and with colotomic structures (due to the rhythmic foundations and structural sustentation produced in the lower register). To create a strong contrast with Section A, the Section B1 is immediately characterized by the use of lower notes doing a sort of rhythmic bass line as it is typically produced by the different gongs and characteristic colotomic instruments in Indonesian music (even if the final result is completely different). To oppose this lower structure, a higher dialogue between musicians A and F appeared, having their intricated voices noticeably interlocked (as visible in Fig. 7.7).

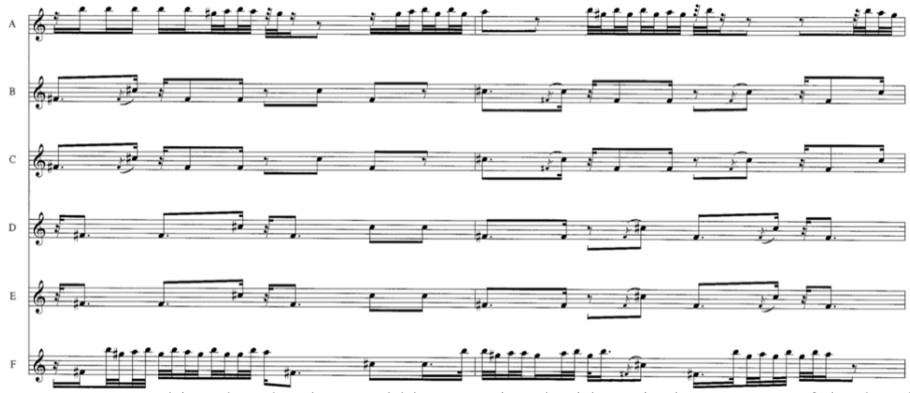


***Figure 7.7.*** Structures presented in *Pléïades* that could be associated with typical structures of the *kotekan* (musicians A and F) and colotomy (musicians B, C, D, and E). Source: *Pléïades*, «*Métaux*», meas. 41-42 (Xenakis, 2013) – © Éd. Salabert.

As is seen above, the structure played by A and F was restrained to a specific region in the higher range of the instrument and limited by fewer notes. As consequence, the result is exactly as described by Spiller (2004, pp. 122-123) when he affirmed:

[15] As Spiller (2004, pp. 68-69) complements about the colotomic structures: "By virtue of their majestic sound and especially honored statues, the large gongs are assigned the role of regularly marking off the passage of rather large chunks of musical time [...]. It is quite difficult for humans to accurately measure a chunk of time as long as thirty-two seconds without somehow dividing it into smaller, more manageable units. The ketuk's sharp attack and quick decay make it an ideal instrument for marking off appropriately smaller units of time. [...] Together these two instrumental sounds act as a foundation for the other instruments' parts; they quite literally lay out a timeline for the other instruments. Ethnomusicologists sometimes call this sort of foundation or timeline, in which regular time periods are delineated by punctuating sounds, a *colotomic form* or *colotomy*. These terms are based on the Greek word for a unit of rhythm (*colon*) and the Greek-derived suffixes for something that cuts or divides into sections (*-tomy* or *-tomic*)."

> Kotekan requires two performers; they perform their parts on instruments of similar range and timbre (sometimes the two players perform their parts together on a single instrument). The two parts are coordinated so that the second part fills in the gaps left by the first part so that those listening hear a single musical line. [...]
> Typically, each of the two parts that combine in kotekan is limited to one or two pitches (that is, one or two gangsa keys) only; limiting the number of keys each player has to worry about frees them to play their parts faster and more accurately.

However, Xenakis did not present only this specific passage of *kotekan* in Section B1; on the contrary, he developed this material and even expanded what generally occurs in traditional Indonesian music. In this way, he elaborated a sort of six-interlocking-parts played by all musicians from Section B2 (Fig. 7.8), breaking the more common manifestation of a two-parts *kotekan*.

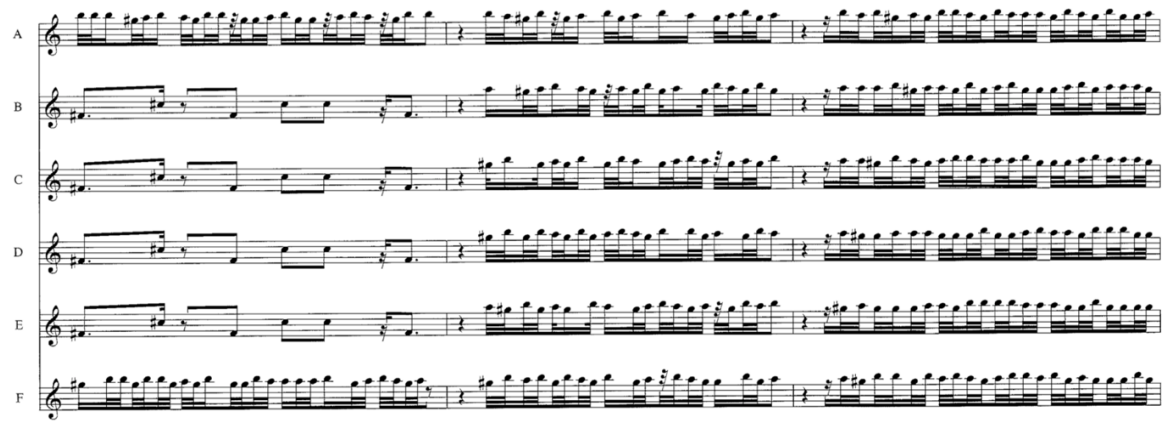


***Figure 7.8***. Transition of B1 to B2 in «*Métaux*» and characterization of the variations that Xenakis produced on the *kotekan*. Source: *Pléïades*, «*Métaux*», meas. 64-66 (Xenakis, 2013) – © Éd. Salabert.

In the image above, it is clear that Xenakis still maintained some typical characteristics of the interlocking parts (or a few notes presented in the same high and narrow range) but now played by all musicians. From this moment, the composer elaborated upon more intricate textures and variations between the six musicians using essentially three notes in a high range (Fig. 7.9a); he then progressively developed more chromatic interlocked passages (Fig. 7.9b) that would culminate in a complete chromatic unison (these unison passages are treated here as "melodic clusters", see more details in the previous chapter). As a conclusive variation of the previous interlocked parts, Xenakis developed an interesting expansion of these "like-*kotekan*" structures. The passage in meas. 76-77 is characterized by the complete expansion of the range and number of notes, having only the rhythmic aspects of some connections with a more typical interlocking development (Fig. 7.9c). With this new texture, the passage explores the different six melodies in a kind of completely expanded and shattered *kotekan*, perceived as an almost random gathering of dense groups of notes without any relation between the different voices.

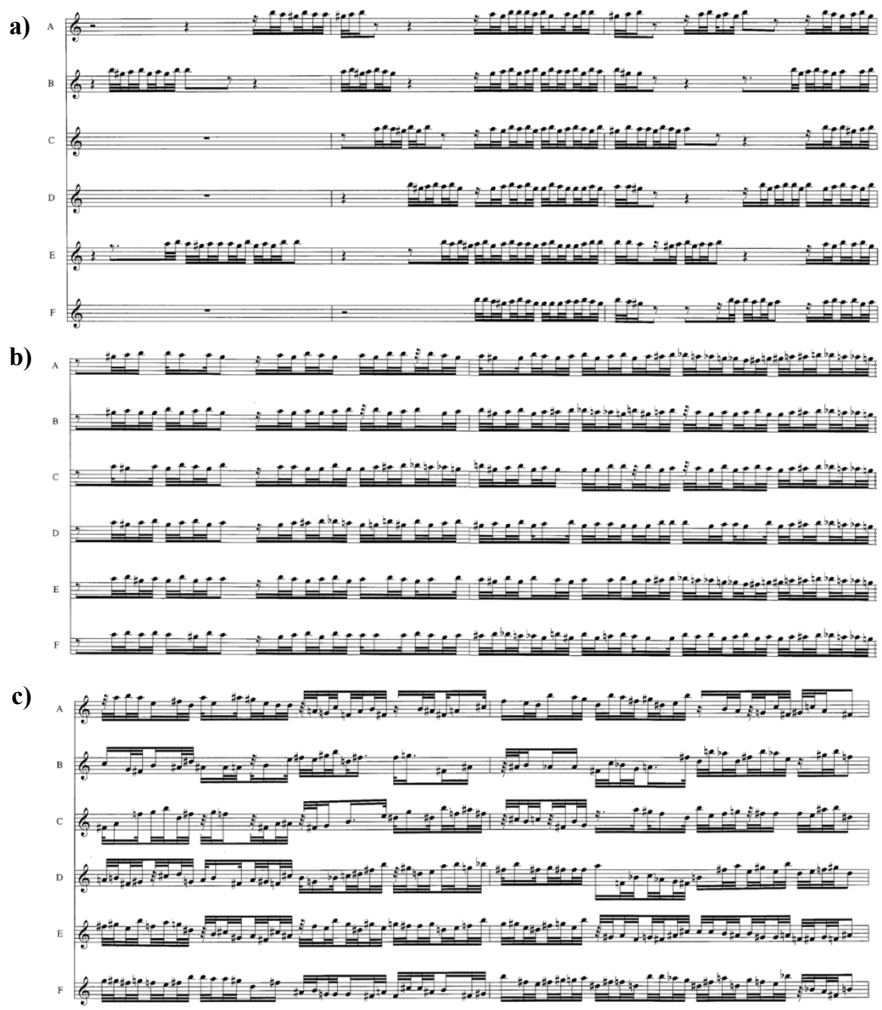


***Figure 7.9***. Xenakis' variations on *kotekan*. **a)** Interlocking parts. **b)** Interlocking parts with chromatic passages. **c)** Full range interlocking parts. Source: *Pléïades*, «*Métaux*», meas. 67-69, 71-72, and 76-77 (Xenakis, 2013) – © Éd. Salabert.

Another excerpt that is tied to «*Claviers*» (from meas. 111 until the end), already discussed in the previous subchapter, could also point some similarities with the *kotekan* accompanied by a colotomic structure. In this specific case, because the material has a direct correlation with gamelan music, the structures composed by Xenakis are derived from the colotomic instruments and implicate elements that has direct implications in the final texture (Fig. 7.10).

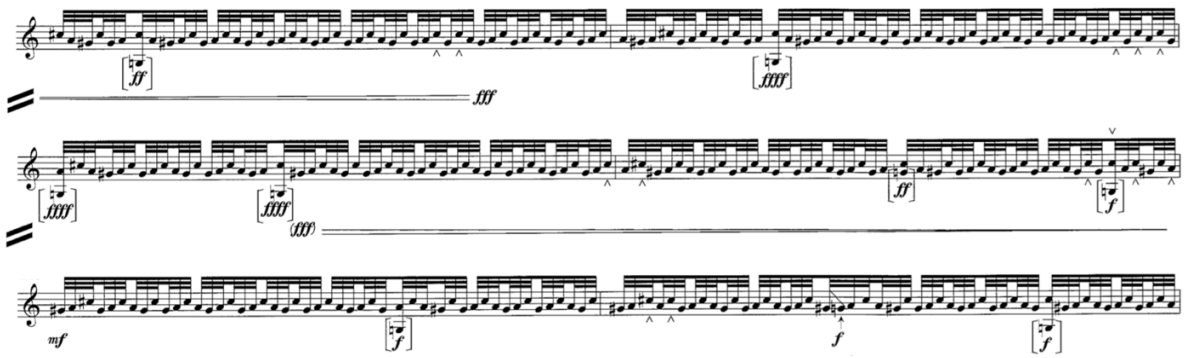

***Figure 7.10***. *Pléïades*' excerpt of a tutti in unison presenting similarities with *kotekan* and colotomic structures. Source: *Pléïades*, «*Claviers*», meas. 114-119 (Xenakis, 2013) – © Éd. Salabert.

In the image above, lower note accents highlight the punctuation caused by the structure directly connected to the colotomic characteristic of the Indonesian music. Xenakis even used two notes separated by an octave to match what represents the lower and the higher gongs of the typical colotomy in the original recording. There is no structure rhythmically interlocked in this part because all musicians are playing in unison. However, it is clear that this fast repetitive melody limited by three pitches (G#, A, and C#) also has a direct connection with the *kotekan* of the gamelan recording. Even if not characteristically interlocked, the higher figures are based on a *kotekan* and the lower ones on colotomic instruments.

This use of structures similar to the *kotekan* is not exclusive to *Pléïades*; in fact, the first time these associations occurred is found in *Retours-Windungen* (1976) for twelve violoncellos, that has an introduction in which the musicians play in the same range and present correlated and interlocked melodic passages limited by three pitches. In *Pléïades*, the expansion of the textures associated with a sort of *kotekan* treatment was variated to the maximum of possibilities during the Section B of «*Métaux*» and this kind of treatment still reappeared in his latest production.

## 7.4 Metallic characteristics and attack properties

One of the rare aspects of a Sixxen clearly determined by Xenakis is the metallic constitution of the bars. Even if the metal type or the shape profile are unfixed, their metallic aspect constitutes a dominant characteristic of the instrument. Likewise, in gamelan music a predominant characteristic is this almost constant metallic aspect of the sonorities. The main instruments are metallic and the melodies are essentially divided in polyphonic parts between multiple metallophones[16] covering a large register. As Tenzer (2011, p. 24) affirms:

> While bamboo, hardwoods and cowhide were always at hand for fashioning flutes, drums and simple keyed percussion instruments, it was the arrival of bronze culture from mainland Asia sometime prior to Hinduism that made the decisive difference for Javanese and Balinese music. As smiths learned to perfect techniques for casting gongs and later, forging slabs (keys), systems of tuning evolved, as did ways of combining the resulting instruments into ensembles.

The fact that most of the instruments are essentially metallic percussion instruments is a fundamental characteristic of gamelan. Although some will incorporate string and wind instruments, the melodic and structural aspects will be determinant in the metallophone section. Whether in Bali or Java, this characteristic is essentially what Xenakis certainly noticed in his 1972 travel and in all

[16] As McPhee (1966, p. 26) points about the constitution of the bars' metal: "*Krawang* is an alloy similar to Western bell metal, and is widely known in Indonesia. Its composition varies somewhat with the locale, but it is generally said to consist primarily of ten parts copper to three of tin. In Bali the alloy may also contain small amounts of iron, silver, and/or gold, and sometimes arsenic. The actual formulas remain the secrets of the *pandès*."

recordings he had heard. The diversity of metal sounds of the many groups he saw in either organized performances or casual encounters during the trip certainly marked the memory of what would be for Xenakis an ideal type of sound for an acoustic percussive instrument. As he expressed to Restagno (1988, pp. 46-47) when discussing about *Psappha*:

> Again, I used rhythmic sieves and also tried to expand the timbral zones of skins, woods and metals. The latter pose the greatest problems, because metal percussion must first and foremost be sonorous and interesting, but it must not resemble either bells or cymbals. Going in search of timbral original solutions I was attracted to the percussion instruments of Asia, which possess a richness of timbre unknown in the West. Here, those instruments are mediocre, because they are built industrially and often crudely. We are often content, moreover, to beat on them without paying attention to the fact that each beat should have its own sonorous substance and that the sound is in itself a living thing, as is believed, of course, in Java, India, China or Japan [underline added].[17]

The fascination that the composer had with these metallic instruments is clear, with his interest in "a richness of timbre unknown in the West" and in the sounds that are in themselves "a living thing" is evident, and remembering that "one of the most beautiful pieces" Xenakis had ever heard was a gamelan piece. It therefore may have motivated him to consider the SIX-XEN primarily as a metal percussion instrument. Manoury (interview by author, 2019) and Mâche (interview by author, 2020) have both expressed that Xenakis was interested by the gamelan and even more particularly by the Balinese gamelan. For them, because of the loud and strident timbre that is normally perceived in Balinese gamelan, Xenakis had a particular interest in these specific ensembles. As Mâche (interview by author, 2020) stated: "That's especially true of Balinese music rather than Javanese because in Bali it's very shiny, it's very metallic so he was looking for that sound... It's true. There's probably an influence."[18]

In a broad perspective, Revol (2000, p. 269) mentions that, among different musical aspects, composers have attached themselves to Asian metallic percussions. Whether in Ravel, Messiaen, Boulez, Mâche, Aperghis or others, the use of metallic percussive sounds would characterize this research of Indonesian sonority. For the author, the use of these sounds in an implicit way (for example in the piano works of Debussy but which would seek to approach the sounds of the gamelan) or explicitly (in the use of gongs and metallophones by Messiaen and Boulez or literally of a gamelan

[17] "Anche in questo caso utilizzai dei setacci ritmici e cercai anche di ampliare le zone timbriche delle pelli, dei legni e dei metalli. Questi ultimi sono quelli che pongono i maggiori problemi, perché le percussioni metalliche devono innanzi tutto essere sonore e interessanti, ma non devono assomigliare né alle campane né ai piatti. Andando in cerca di soluzioni timbricamente originali fui attratto dalle percussioni dell'Asia, che posseggono una ricchezza timbrica sconosciuta in Occidente. Da noi quegli strumenti sono mediocri, perché vengono costruiti industrialmente e spesso in modo grossolano. Spesso ci si accontenta d'altronde di picchiarci sopra senza stare a pensare che ogni colpo dovrebbe avere una sua sostanza sonora e che il suono è in sé stesso una cosa vivente, come si crede, naturalmente, a Giava, in India, in Cina o in Giappone." (Restagno, 1988, pp. 46-47).

[18] "C'est particulièrement vrai de la musique Balinaise plutôt que Javanaise parce qu'à Bali c'est très clinquant, c'est très métallique donc il cherchait cette sonorité… C'est vrai. Il y a probablement une influence." (Mâche, interview by author, 2020).

group by Aperghis) can thus already attest to an interest for a certain correlation of timbres. In the case of Xenakis, the interest in those instruments inspired him to conceive of a new instrument, of which could also represent his compositional perspectives (as discussed in Chapter 3).

Another aspect that reflects this interest and that Xenakis repeated several times is related to the hammers that are recommended for playing the SIX-XEN. In all editions of *Pléïades,* the composer expressed "Use metallic hammers whenever possible" (Xenakis, 1979) or "Use metal hammers" (Xenakis, 1988). This term implies the use of tools such as those used in gamelan practices, or to something that might stimulate a kind of attack with the same aspects of physical and acoustic results. As demonstrated by Dierstein, Roth, & Ruland (2018) the tool to stimulate a percussion instrument is a key factor in the development of its timbre. Depending on its constitution, form, materials, and playing modes, several manifestations of frequencies and spectral development will arise.

Gamelan mallets, or *pangguls*, are diversified and characterized by several types of materials and shapes, but a common morphology of being hammer-like is dominant. The *panggul* are presented in many variations, but generally as hammers of wide spectra, ranging from the lowest to the highest pitches and extremely varied in shape and constitutive materials. It must be noted that the word gamelan originates from the low Javanese word *gamel* that makes reference to a hammer (such as a blacksmith's hammer) as stated by McPhee (1966). The hammer is thus an essential element that defines the essence of gamelan practices and the spectral results of the coordinate attacks. Either in Java (Fig. 7.11) or in Bali (Fig. 7.12), the morphological aspects will point to an object resembling a hammer.

*Pangguls* therefore include a huge variety of hammer types, each adapted to the instrument that will be struck with it. For lower instruments, the hammers will generally be larger but of a softer wood (Fig. 7.11c), sometimes coated with a layer of rubber (Fig. 7.12c). For higher pitched instruments, they will generally be smaller but of a denser and harder material (Figs. 7.11d and 7.12d), either a much harder wood or even animal horns. Dierstein, Roth, & Ruland (2018) explain that this is tied to the frequencies that need to be stimulated and the characteristics of attack and resonance that need to be reached[19].

[19] As Dierstein, Roth, & Ruland (2018, p. 27) stated: "For most percussion instruments, particularly the idiophones, it is the case that, the lower they are, the larger they are constructed. Correspondingly, large, heavy and soft mallets are customary for use in low registers or to emphasize low-frequency components, while small, hard mallets are required for high pitches or light, overtone-rich sound effects. The mallet also influences the decay duration of an instrument, i.e., its sound envelope. Hard mallets result in fast and high peaks upon impact and a relatively short decay sound. Conversely, instruments that are struck softly initially vibrate slowly and moderately, but in many cases, are able to sound for longer."

a) b) c) d)

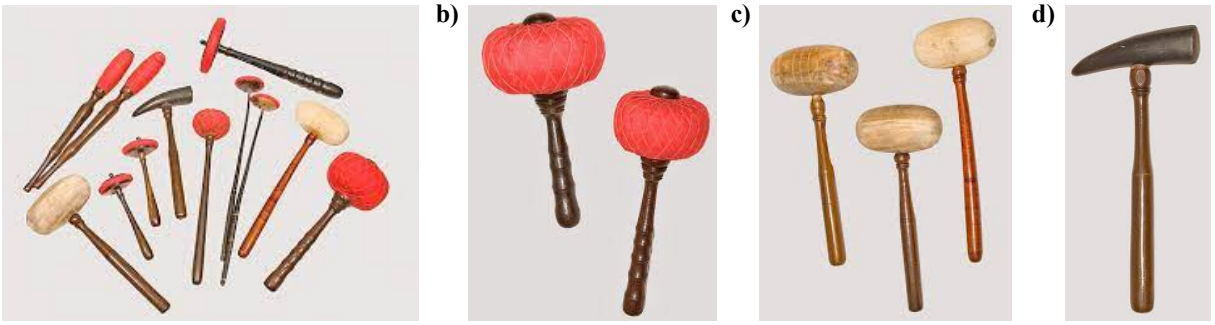

***Figure 7.11***. Typical metallophone mallets and hammers used by Javanese gamelan ensembles. **a)** Diverse mallets gathered. **b)** Mallets used for gongs. **c)** Hammers used for low metallophones (sarons). **d)** Hammers used for high metallophones (penerus). Source of all: © National Music Museum (University of South Dakota).

a) b) c) d)

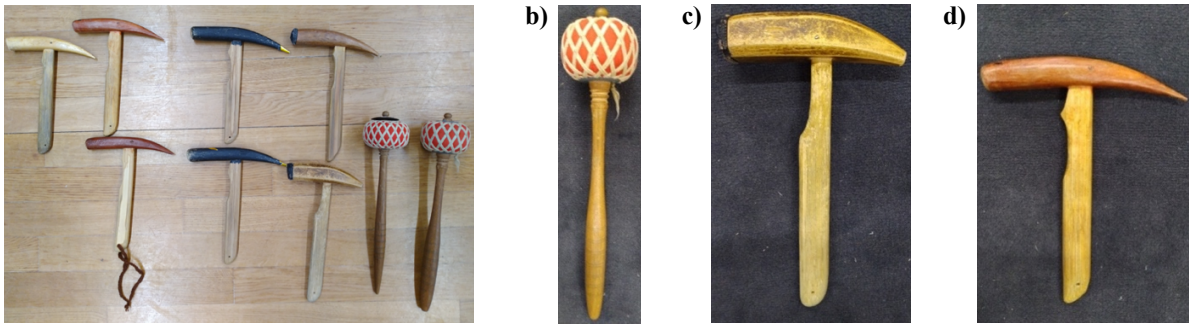

***Figure 7.12***. Typical metallophone mallets and hammers used by Balinese gamelan ensembles. **a)** Diverse mallets gathered. **b)** Mallets used for low metallophones (jegogans). **c)** Hammers used for low metallophones (calungs). **d)** Hammers used for high metallophones (gangsas and kantinlans). Source of all: Photos by the author.

The attack of this type of mallet on metal bars interested Xenakis, and after years of regular exposure, this technique guided the sort of requirements he addressed for percussion players. Two aspects could emphasize this instrument: firstly, the fact that the composer wanted to create a kind of hammer of his own to play the SIX-XEN (see more details in Chapter 3–Section 3.1.1 and Chapter 10–Section 10.1.7) and secondly, the observations related to the mallets during numerous rehearsals, recordings and concert preparations. In the *Pléïades* sketches, it is possible to see an initial drawing of what would be a potential prototype hammer for playing Sixxen. It is clearly a double-tone hammer with one side in metal and the other in plastic. These two options show that there was initially an interest in very present attacks with a lot of high harmonics on impact. It is not clear which part of the head was supposed to be used for which instrument. He either imagined that both could be used for a Sixxen in different passages of «*Métaux*», or he imagined that the metal part could be used for a Sixxen and the plastic part for keyboards and drums during the performance of «*Mélanges*»[20]. Regardless of which side was supposed to play which type of material, the interest for a very hard attack with a lot of harmonics is obvious.

[20] As Dierstein, Roth, & Ruland (2018, p. 27) stated: "the mallets should not be harder than the material that is struck. In principle this excludes all metal mallets from being used on wood and skin in medium/loud dynamics, although sweeping sounds are by all means possible."

As this specific model of hammer was not developed[21] (or at least no prototype was mentioned by the musicians who worked with Xenakis), it remained only in his sketches. Nevertheless, by consulting various archives, photos show that the first musicians to work with the composer used a kind of hammer. At the premiere of the instrumental version in 1979, Les Percussions de Strasbourg adopted a hammer model that seems to be originally applied to play tubular bells (Fig. 7.13).

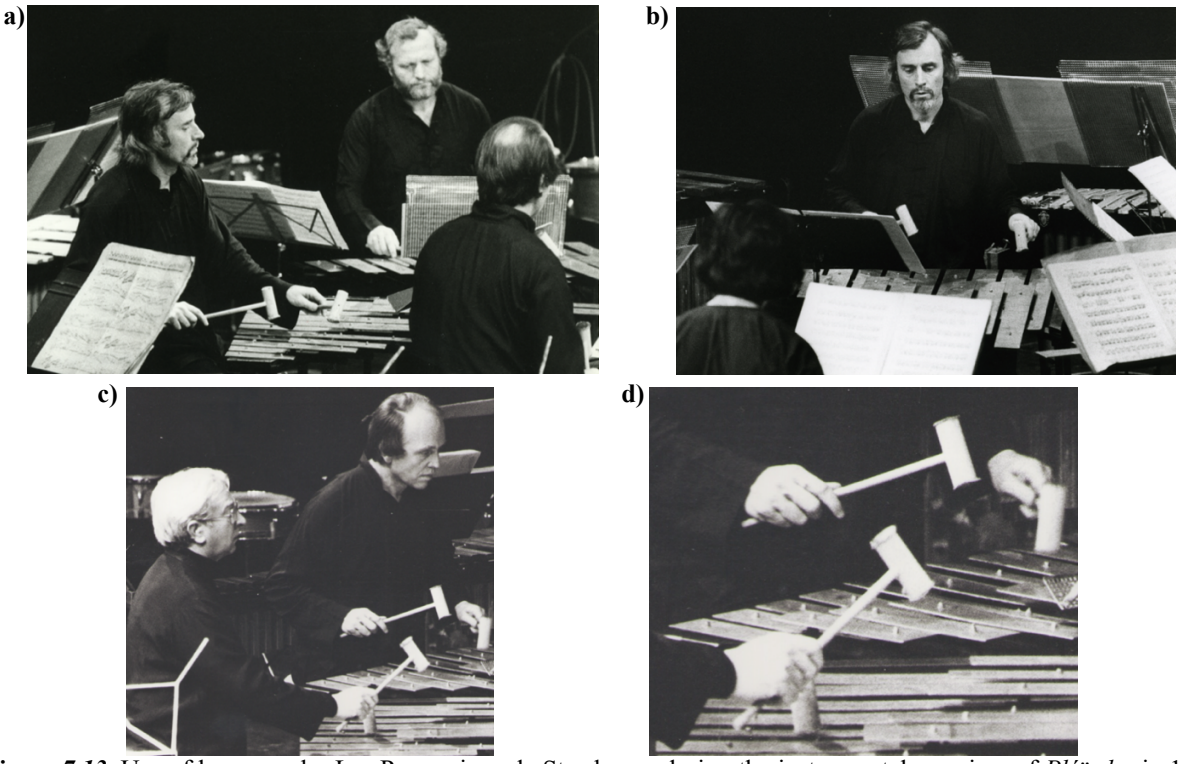


***Figure 7.13***. Use of hammers by Les Percussions de Strasbourg during the instrumental premiere of *Pléïades* in 1979. **a)** Claude Ricou, Georges van Gucht and Gabriel Bouchet (back). **b)** Olivier Dejours (back) and Claude Ricou. Source of both: © LPSA. **c)** Jean-Paul Finkbeiner and Gabriel Bouchet. **d)** Detail. Source: Gabriel Bouchet's personal archives.

In general, tubular bell hammers can be made from different materials of variable hardness, such as wood, leather, acrylic, plastic or rubber, among others. It is not for certain which kind of hammer was used, but it seems that Les Percussions de Strasbourg used wooden ones (Fig. 7.11d). This use of hammers was no longer common for the French ensemble after their change of Sixxen prototype. When the Hébrard-Abitbol model was created, Les Percussions de Strasbourg started to use yarn mallets. Xenakis still insisted that a fundamental aspect of Sixxen's playing style was the attack. In a 1985 letter exchanged with Claude Ricou, he wrote: "I wonder if it wouldn't be interesting

[21] This can be explained by the fact that metal can obviously break the instrument that is supposed to be played. Any use of metal sticks must be well coordinated with the dynamics and material types of the instrument being played because otherwise it can be broken. As Dierstein, Roth, & Ruland (2018, p. 159), "There is a danger, particularly with brass-headed mallets, that the impact will damage the surface of the instrument, causing dents or scratches. This includes supposedly hard METAL INSTRUMENTS".

to use harder sticks so that the sound is less soft or is it a question of recording?"[22] (Iannis Xenakis, mail to Claude Ricou, December 16, 1985).

Generally speaking, this combination of metallic timbres stimulated by hammers is typical of Indonesian music and is one of the fundamental elements in the beginning of the design of Sixxen. This combination was of constant interest to Xenakis, particularly in the spectra of percussion and specified many times as the playing modes for his instrument.

## 7.5 Internal tuning properties of sets and the dynamic sense of plurality

Depending on geographical, historical and social conditions as well as technical aspects, the tuning systems of different gamelans are vastly different. It is therefore completely normal to hear two gamelan sets playing the same melody but with completely different frequencies and therefore with a consistently unique result in terms of pitches. As Tenzer (2011, p. 36) mentioned, "While there are common or popular tunings, there is no agreed upon norm that would make all gamelan on the island compatible with each other. This ensures that each set of instruments has its own characteristic sound and tonal personality." Spiller (2004) reiterates that this aspect also characterizes the Javanese gamelan because constructors and tuners[23] do not adhere to a single standard, being more prone to give each set of gamelan instruments a unique version. As he complements,

> Because the instruments are always played as a set, unlike Western instruments which are interchangeable from one ensemble to another, intonation differences between gamelan sets present few practical problems. Those who listen to gamelan music, in fact, appreciate the intonation differences between one gamelan and another. Each set of instruments imparts its own subtle character into all the pieces the musicians play on it. (Spiller, 2004, p. 66).

This relativity of tunings in gamelan music has fascinated many avant-garde composers. In this regard, there is an intention to move away from the whole European musical tradition of the previous centuries. Pierre Boulez, for example, stated that:

> There is one more important point–it's not that you hit gongs, or use gamelan. That is incidental. But there is a lesson from the Eastern tradition: our Western instruments have tended towards standardization and specialization; they all produce the pure sound on their own, give the same C in all degrees. There is no individualization of sound. On the other hand, in the East, an instrument is not tuned definitively: there is a relativity of instruments, not only relativity of the timbre but also relativity granted to each universe depending on the momentary creation. It seems important to me to use instruments, not as a universal English key, but according to their particularity.[24] (Boulez *apud* Revol, 2000, p. 379).

[22] "Je me demande toutefois s'il ne serait pas intéressant d'utiliser des baguettes plus dures pour que le son soit moins mou ou bien est-ce une question d'enregistrement ?" (Iannis Xenakis, mail to Claude Ricou, December 16, 1985).
[23] The gamelan making involves number of activities and the responsible is generally called a *pandé*. *Pandé*, also known as *pandé krawang*, is an Indonesian term attributed to each craftsman responsible for the process that constitutes a gamelan making.
[24] "Il y a encore un point important – ce n'est pas que l'on frappe sur des gongs, ou que l'on utilise du gamelang. Cela

With all due proportions, the same phenomenon occurs with the SIX-XEN. Depending on the ensemble, the metal used, the size of the bars and particular technical choices, two Sixxens will generally have two completely different tuning properties (as detailed in Chapter 3–Section 3.1.2 and Chapter 10–Section 10.1.6). Even if all instructions given by Xenakis are respected, the result is always particular and unique.

Not only will two different Sixxens or two gamelan sets sound consistently different, but also within one set there is a difference in tuning properties between its parts to characterize its sounds, as a norm of construction. In both cases, there are differences that are necessary to avoid unisons within each set that are consciously required and produced to characterize the instruments by themselves. This establishes another similar aspect between the SIX-XEN and gamelan when analyzing the plan of internal tunings and correlations of frequencies between bars that are supposedly of the same "height", both demanding subtle differences between pitches to produce distinguishable beating effects. This typical sound quality, even though it is manifestly different in each type of set, brings a certain congruent sound quality that is similar, resulting from the constant presence of beatings. Thus, the sonority that is established because of the dense and rich texture in frequencies and the quality of the timbre created because of this constant overlapping of close frequencies is a fundamental base that connects these two sets of instruments. The acoustic principle is similar and the resulting sonorities are equivalent.

However, as much as some sound qualities are equivalent, there is an intrinsic difference between a Sixxen and a gamelan set with regard to the number of frequencies that are theoretically required for each bar. While in the SIX-XEN case the resultant is theoretically made up of six shocking frequencies, in the gamelan set it consists of two different frequencies. Thus, for each designed bar in a Sixxen, there must be six non-unison frequencies, distributed on each part of the set being named by Xenakis as A, B, C, D, E and F. On the other hand, in a gamelan set the instruments are built to establish pairs of approximate frequencies being called *polos* or *sangsi*[25] as variants of the same type of instrument. In terms of a practical example, for a same bar taken from two metallophones

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c'est de l'accessoire. Mais il y a une leçon tirée de la tradition orientale : nos instruments occidentaux ont tendu vers la standardisation et vers la spécialisation ; tous produisent le son pur par eux-mêmes, donnent le même do à tous les degrés. Il n'y a pas d'individualisation du son. Par contre, en Orient, un instrument n'est pas accordé définitivement : il existe une relativité des instruments, pas seulement relativité du timbre mais aussi relativité accordée à chaque univers dépendant de la création momentanée. Il me paraît important d'utiliser des instruments, non comme une clé anglaise universelle mais en fonction de leur particularisme." (Boulez *apud* Revol, 2000, p. 379).

[25] *Polos* or *sangsi* then refers to the difference between the tuning pairs, with the *polos* instrument being lower in pitch and the *sangsi* being higher. For example, the difference between a polos gangsa and a sangsi gangsa is that the former is supposed to be lower than the latter. This difference will also establish which voice each instrument will characterize in the melodic interweaving of a *kotekan* (the melodic structure shared between different voices by complementary rhythmic combinations, as previously addressed–Subchapter 7.3). The *polos* instruments will generally be downbeat and the *sangsi* upbeat.

of the same category and of the same gamelan set (such as the first bar of two kantilans e.g.), one will be tuned a little higher than the other. As a result of the beating effect, this difference produces a perceptible pulsation with a shimmering and unstable sound that oscillates and waves constantly. In the case of the Sixxen, considering the first bar of the set as a whole, the effect will be created by the presence of six different and relatively close neighboring frequencies.

Defining this aspect of gamelan instruments, Spiller (2004, p. 120-1) stated that "the keyed instruments come in matched pairs. The instruments in a pair are virtually identical except for one important detail: The keys of one instrument are tuned to be slightly lower in pitch than the keys of the other." In comparison, the description of SIX-XEN by Xenakis (1988) shows that "for a given pitch, the 6 metal pieces will only give approximately the given pitch; it is even recommended that these 6 notes, taken two by two, should not be in unison".

In both cases, these differences between bars create a particular aural effect tied to the presence of beating. The amount, the quality and the interconnection of the beatings is a complex phenomenon that is established as result of many factors. As Spiller (2004, p. 120-121) affirms about gamelan:

> When the corresponding keys on the two instruments are stuck at the same time, the ear perceives not two dissimilar notes, but rather a single note that seems to shimmer and dance because it oscillates quickly between louder and quieter. [...] The sound waves excited by the two keys interact with one another - sometimes strengthening each other so the ear hears more sound, sometimes cancelling each other out so the ear hears less sound. These variations in volume happen very quickly (several to many times per second). If the two pitches are relatively close, the result will be a fast shimmer; two pitches that are a little bit further apart will create a more leisurely undulation.

Tenzer (2011) explains that these physically perceived aspects changed historically, with older styles of music having a tendency for slower beatings and modern styles with more interest in rapid and intense oscillations. Also, according to Tenzer, this is a precisely and consciously measured phenomenon, because most gamelan sets have a beating rate of between 5 and 8 times per second that depends on the preference of the gamelan's tuner and the type of gamelan involved. He also stated that "In the case of a 7-vibration difference, every pair of instruments from the lowest to the highest must be tuned so that the one vibrates 7 fewer times per second than the other." (Tenzer, 2011, p. 38).

Even the octave can be relativized due to this effect because, as Tenzer (2011, p. 38) affirmed, "in order to keep the rate beating constant throughout the gamelan, octaves and other intervals within the scale must sometimes be compromised." In addition, because of prolonged use and the tendency to change pitch over time as constant use of percussive acts wears out the bar and its tuning, many instruments can present octave differences. What was intended to be two groups of notes for the same bar can therefore become a multitude of frequencies that clash with each group of the same played note. If the gamelan in theory is based on the relationship between *polos* and *sangsi*, in practice it is

more complex. The acoustic similarities between a gamelan and a Sixxen therefore reflect that these internal relationships of tuning become complex and based on the diversity of constructs as a result.

It is also important to consider that microtonal aspects are perceptible in many examples of non-Western music. The traditions that are not based on equal temperament will forcibly express their musical characteristics differently when determining the frequencies of interest, having structural consequences not only in terms of harmony and texture, but also construction of instruments. Xenakis was conscious and vocal of this practice in several interviews (as in Restagno, 1988; and Varga, 1996). The fact that he observed so many different gamelan sets between Bali and Java, with each one characterized by particular properties but yet still presented as a congruent sonic entity that aggregated the community and characterized a collective sense of music-making, impelled him to find similar qualities in his own instrument. It inspired and assured him that even with a given considerable margin of freedom within the possibilities of the instrument construction, a coherence in the manifestation of the diverse resultants could still be guaranteed.

## 7.6 The sense of collectivity and the instrumentation "as in Indonesia"

It is certain that Xenakis could observe the collective character of the gamelan practice and the unicity of a gamelan set as an entity. During his trip to Indonesia, it was certainly evident that gamelan itself is a collective practice, a plural instrument gathering many musicians. In this perspective, Tenzer (2011, p. 16) expressed that in a general way, the gamelan:

> means orchestra, or the music played by the orchestra, but it corresponds to the Western sense of that word only in that it conjures up an image of a group of people making music together. To be precise, gamelan refers to the instruments themselves, which exist as an inseparable set, and not to a group of individuals who gather to play upon them. The components of the gamelan come in many combinations, tunings, and sizes, each with specific religious or secular functions.

This concept of an "inseparable set" that is fundamental to the gamelan (a sort of unity in diversity) is also strongly present in the initial concept of the SIX-XEN, requiring a collective sense of performing. Even if Xenakis and later composers changed this sense of collectivity and composed pieces with less unities, the initial concept is eminently comparable to this collective instrument as an inseparable set.

As an inseparable set, the gamelan has particularities inherent to these collective practices and complex composite timbres that are a clear mark of its potential instrumentations. The association of certain instruments may therefore refer to these types of collective timbres of the gamelan, thus constituting another important and recurrent factor of correlation among the influences from Indonesian music to Western contemporary music. By the admission of many of Xenakis' composer

colleagues, different gamelan instrumentations were a direct inspiration to their musical choices. Thus, in different moments from the end of the 1940s until the 1970s, the use of the vibraphone, the glockenspiel and other percussion keyboards was a way of referring to the gamelan instruments.

Olivier Messiaen, Xenakis' primary composition teacher, referred to gamelan many times (including in Xenakis own classes with class note examples in Chapter 1–Section 1.1.2). Besides the previously mentioned association in *Turangalîla-Symphonie*, the composer also executed important structural decisions by influence of Indonesian sounds in his opera *Saint François d'Assise* (1975-1983). About this, Messiaen stated that: "Almost all the tableaux begin not with an overture but with a set of keyboards where the xylophone, the xylorimba and the marimba are mixed. This is a way of paying homage to Bali, where performances are always introduced by the playing of metallophones."[26] (Samuel, 1986, p. 245). About another passage of the same work, he stated: "I have even introduced here a bird, a Bluebird [...], and whose song I have entrusted to the xylophone, the xylorimba, and the marimba. It is still a kind of Balinese music, but with triumphant accents and a whole cloud of trills on strings and cymbals."[27] (Samuel, 1986, p. 248).

Pierre Boulez is another composer who also recognized the intersection between percussion keyboard and gamelan. He was explicit when he affirmed that: "I see in the vibraphone a kind of substitute for the Balinese gamelans, which we can't get. These Indonesian orchestras, consisting of 40 to 50 'tuned' gongs, among other things, fascinate me greatly."[28] (Boulez, 1981, p. 448).

Therefore, it is in this kind of associative context of the instrumentation choices that Xenakis placed himself. In «*Claviers*», the composer used mallet keyboards that then allowed him two precise elements: the reinforcement of the pitch collection and the scalar material of the sieve that has intervals suggestive of a pentatonic scale, and the use of instruments with timbres similar to the instruments used in gamelan music. This set of three vibraphones, xylophone, marimba and xylomarimba has similarities with the metallophones (gender, saron, gangsa and others) and xylophones (gambang, tingklik and others) of different gamelan ensembles that he had learned during his studies with Messiaen and that he heard in his trip to Indonesia.

Until this point, all aforementioned discussion focused on a specific aspect and a particular movement of *Pléïades*, be it «*Métaux*» or «*Claviers*». But one must also consider that Xenakis

[26] "Presque tous les tableaux commencent non par une ouverture mais par un jeu de claviers où se mêlent le xylophone, le xylorimba et le marimba. C'est une façon de rendre hommage à Bali, où les spectacles sont toujours introduits par le jeu des métallophones." (Samuel, 1986, p. 245).
[27] "J'ai même introduit ici un oiseau, un Merle bleu [...], et dont j'ai confié le chant au xylophone, au xylorimba, et au marimba. C'est encore une sorte de musique balinaise, mais avec des accents triomphants et tout un poudroiement de trilles aux cordes et aux cymbales." (Samuel, 1986, p. 248).
[28] "Je vois dans le vibraphone une sorte de substitut des gamelans balinais, que nous ne pouvons pas nous procurer. Ces orchestres indonésiens, composés entre autres de 40 a 50 gongs « accordés », me fascinent beaucoup." (Boulez, 1981, p. 448).

brought all these previous elements together into one movement. By composing «*Mélanges*», he then assembled the sonorities and materials treated separately in the other movements (including the non-tempered metallic bars of the SIX-XEN, the beating effects, the presence of *pelog* scales on the percussion keyboards, the gathering of metallophones and xylophones). Aggregating these previous materials, he thus enhanced the listening of aspects very similar to the Indonesian music.

## 7.7 Spatial disposition and instrument layout

In the introduction of the first edition of *Pléïades,* there are two possibilities of disposition of musicians on the stage: the instruments in the center with the public surrounding the ensemble or a frontline with the public positioned facing the front of the stage. The composer specifically stated that, if the circular disposition is adopted, "the metals (SIXXEN) should be placed in the middle of the other percussion instruments."[29] (Xenakis, 1979, p. ii). The composer's preference designates that this disposition surrounded by the public, as photos of the first instrumental performances by Les Percussions de Strasbourg can attest. Lacroix associated this circular arrangement with the kecak, a dance performed by men from Indonesia generally using the voice and repetitive phonemes as the source of sounds. The author stated that: "This circle arrangement is reminiscent of the particular arrangement sometimes found in Indonesian music (especially in Balinese kecak)." (Lacroix, 2001, p. 33). She also estimated that a rhythmic cell of a transitional motif in *Pléïades* would possibly be a sung kecak cell that is between sections. As she emphasized:

> We observe, with regard to the role of "signal" of this last motif, the troubling proximity that can be found in the element of three repeated values that is often used to trigger a section change in Indonesian music. This can be observed in gamelan, or even more so in Balinese kecak (or Cak), sometimes considered as its vocal equivalent[30] (Lacroix, 2001, p. 67).

Both comparisons made by the author are not based on direct evidences and cannot be verified as Xenakis never made any statement about kecak. There is no reference that associates *Pléïades* to kecak in terms of disposition of the instrumentalists or in terms of rhythmic motives, and neither in his personal archives or correspondences (at least not until now). Thus, numerous assumptions by Lacroix (2001) do not stand with descriptions made by Xenakis himself and are not supported by the composer's comments anywhere. With that in mind, it is also important to consider that the composer

[29] "Dans le premier cas (au centre de l'audience), les métaux (SIXXEN) devraient être placés au milieu des autres instruments de percussion. Dans l'autre cas, les SIXXENS devraient être placés de telle sorte à servir au mieux l'interprétation." (Xenakis, 1979, p. ii).

[30] "[...] nous observons, à propos du rôle de « *signal* » de ce dernier motif, la troublante proximité que l'on peut lui trouver dans l'élément de trois valeurs répétées qui sert souvent à déclencher un changement de section dans la musique indonésienne. Ceci pouvant s'observer dans le *gamelan*, ou plus encore dans le *kecak* (ou *Cak*) balinais, parfois considéré comme son équivalent vocal" (Lacroix, 2001, p. 67).

was always experimenting different instrumental dispositions and ways to place the public (*Persephassa*, *Terretektorh*, the *Polytopes* and the disposition for *Taurhiphanie* are clear examples of that). If there is a direct connection with the trip to Indonesia, this could be better associated with the number of gamelan performances that they saw and the disposition that they generally experienced in different regions of Bali and Java, as highlighted by the composer in his personal notes or attested by the dispositions to traditional performance in the places they visited (Fig. 7.14).

**a)** **b)**

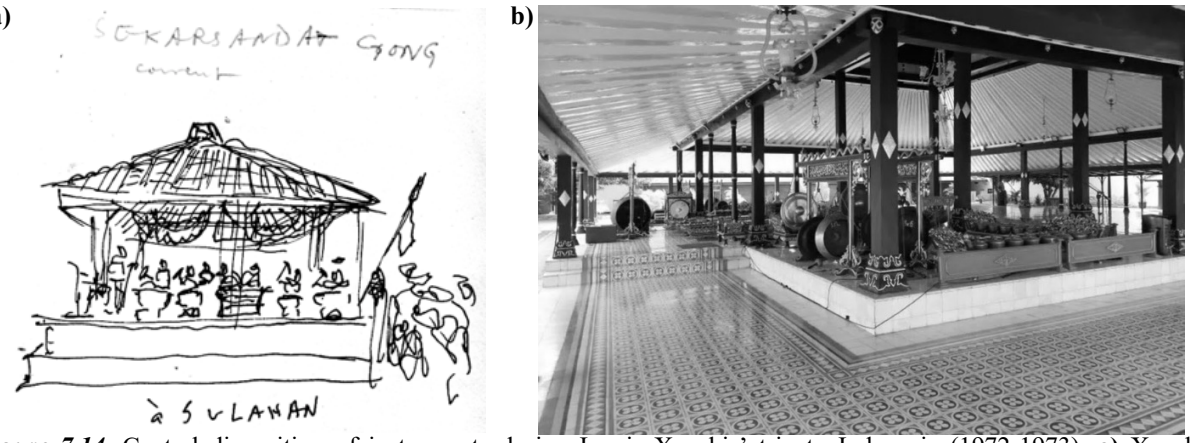



***Figure 7.14***. Central disposition of instruments during Iannis Xenakis' trip to Indonesia (1972-1973). **a)** Xenakis' personal note produced in Bali. Source: © Famille I Xenakis DR (Notebook 38, p. 2). **b)** Traditional disposition of the gamelan in the Kraton Ngayogyakarta Hadiningrat (Yogyakarta, Java).

Xenakis and his peers experimented different public performances in Indonesia, and many of them placed surrounding the musicians–as attested by the photos consulted (archived at the *Collection Famille Iannis Xenakis* and BLGF). However, it is unclear if there is a true connection with the disposition of instruments as required for *Pléïades*. From all previous aspects of the present chapter highlighted in terms of direct or indirect Indonesian tradition connections, this is perhaps the most skeptical, at least until proved otherwise. Even if fragile as a direct or indirect connection, this kind of circular and central disposition could be used to reinforce some imaginative associations implicating a kind of "Indonesian *modus operandi*". It is thus in the performative perspectives that the discussion will be from now addressed, consisting of a completely new section.

# Part III – A practice-based research and artistic development

# Chapter 8. A personal journey through Xenakian sounds

*Mais un instrument n'est optimal que dans un certain contexte.*
Jean-Claude Risset (2018, p. 34)

Several authors have worked on aspects of percussion performance during their graduate studies. Thus, when taking only previous dissertations into consideration, it is obvious that different approaches were proposed and diverse practice-based research on percussion were developed. Chaib (2012), e.g., discussed gesture in percussion performance and, using an experiment with a quantitative methodology, he discussed the perception of continuity, suspension, and conclusion in the interpretation of the percussion repertoire. The author presented many concerts with percussion ensemble repertoire and four specific solo recitals during the activities of his research. Stene (2014) developed a discussion about unconventional instruments used in modern and contemporary literature for percussion. He addressed how the role of the percussionist evolved during the mid-twentieth century onwards and how the experimental scene influenced new approaches to percussion instruments. Stene, who premiered many pieces during his project, annexed the video recordings and scores of the pieces as well as practical applications to exemplify the main subject. Devenish (2015), in another approach, treated the historic aspects of the Australian repertoire for percussion. She focused on aspects of the international avantgarde influence and the creation of the contemporary local repertoire from the 1970s to the 2000s, including the presentation of two solo recitals and a lecture recital. These are just few examples of many different approaches and contributions to the percussion repertoire canon.

As for practice-based research on Xenakis' works for percussion specifically, Longshore (1999) worked on performative aspects of *Rebonds* during his doctoral studies and addressed the way he, as a performer, constructed his interpretative approach while mentioning two other pieces. The author specifically highlighted in which circumstances he had the first contact with the piece and presented a brief analysis of the polyrhythms in *Rebonds A* and the cyclic structures in *Rebonds B*. Smith (2005) discussed the aspects of the notation in pieces for multiple percussion through a historical lens. Her focus was on addressing the non-standardization and diversification of writing in the composition for percussion, and she thus mentioned *Psappha* (1975) and *Rebonds* (1987-1988)–among many other references–in her overview of the subject. However, her considerations about both pieces were not based on Xenakis' personal notes and the different phases of the composer's creative process either. The dissertation also did not indicate which repertoire was performed during the recitals and did not explicitly state the aspects that correlated its theoretical and practical perspectives. Haynes (2009) discussed *Rebonds* and *Psappha* using aspects of previous analysis to discuss the performatives challenges to learn the pieces. Stuart (2009) elaborated on his performance studies and the challenges

that he experienced having to prepare a demanding repertoire as a percussionist with focal dystonia. The discussion, treated in a personal manner by the author, included *Psappha* and addressed many pieces that he performed during his doctoral artistic research. Tinkel (2009) extensively addressed the process to learn *Rebonds*, producing a broad panorama of the construction of the piece in terms of articulation, dexterity and precision on the polyrhythms.

Teodori (2012) situated *Persephassa* (1969) in a larger historical context of the percussion ensemble repertoire. He also highlighted some structural aspects that represent the basic architecture of the piece. However, even if a historical approach was proposed, a lack of access to documents of archives prevented Teodori from deepening the aspects of the subject and his dissertation did not specify which repertoire was performed. Rockwell (2015) discussed *Psappha* in terms of its historical aspects and performative particularities, by means of a formal analysis presented as a "study guide". He then proposed a transcription of the piece into a more conventional form of notation, but the result not even discussed the main reasons why Xenakis developed the graphic notation typical of this piece. The repertoire performed alongside this dissertation was not mentioned, and the practice-based research was thus almost entirely focused on the transcription itself.

There are countless other examples[1], but it appears that when discussing Xenakis, *Psappha* and *Rebonds* are typically the primary focus of scholarly researcher in percussion. Consequently, when considering the vast production of the composer for percussive instruments, a certain underrepresentation of the other pieces unfortunately emerges. In the same perspective, a lack of interest and/or access to documents that could give a better basis to the discussion seems recurrent. Most of the above authors did not consult the archives and sources of potential interest, even with discussions based on historical perspectives.

During the present research work, a focus on archival material brought singular and innovative perspectives to performance. With all the previous historical elements discussed (in Chapters 1 and 2), the characterization of the instrument and applications by Xenakis (in Chapter 3 and 4), as well as the analysis of *Pléïades* (in Chapters 5, 6 and 7), it is possible to trace important aspects of the piece interpretation. In this way, the first half of the chapter will focus on certain aspects to the performance of *Pléïades*, while the second half will address the artistic development during the present research work. Having a more personal account of the entire artistic development, this chapter will be

[1] To name a few, it is possible to indicate: Flint (1989) that produced a formidable analysis of *Psappha* based on archival research presented as a doctoral dissertation and partially published later (Flint, 1993; 2001); Johnson (1993) and Aluotto (2011), discussing interpretative possibilities in *Psappha* in their master thesis; Schotzko (2010), discussing *Psappha* in comparison to the Greek tragedies; Beyer (2005), who addressed the mathematical aspects of the golden section in *Rebonds*, trying to find how this proportion could be perceived in the piece; Schick (2006), who addressed *Rebonds* and *Psappha* in the middle of number of other pieces; Khujaeva (2019), analyzing the geometrical spatialization in *Persephassa* in her master research; Jones (2020), who addressed *Okho* and *Rebonds* in his master thesis; Besada, Barthel-Calvet, & Cánovas (2021), who presented an innovative approach in an article about the sieve theory in *Psappha*; and Pillinger (2022), who analyzed text and music in an article about *Kassandra*.

presented in the first person. It will seek to emphasize the personal aspects that led to the decision-making throughout the research process, which promoted a constant feedback and dialogue between the theoretical and practical perspectives. It will also highlight a more imaginative point of view about the results of the research, creating a connection between the data presented in the other chapters with my own artistic aspirations and future objectives.

The written part of the present chapter is connected to recordings, documents and images that are accessible online through the following link: *www.ronangil.com/doctorate-concert-intro* (Fig. 8.1). Among these are at least four hours of recordings, four complete concerts characterized by sixteen pieces individually (of which eight were recorded as their world premiere), as well as complementary information about those same concerts and repertoire (including program notes, the scores of the commissioned pieces, and photos of the events and their preparation).


***Figure 8.1***. Access to the additional documents and recordings of the artistic work. Link: *www.ronangil.com/doctorate-concert-intro*

The online layer of the present chapter is divided in four concerts. The present written layer is subdivided in two subchapters, with the first being a broader perspective about the potential of interpretative aspects in *Pléïades*, and the second being my personal artistic propositions during the research.

## 8.1 Interpretating *Pléïades*: a multiverse of choices

There are many interpretative aspects that could be presented and discussed. Here, however, three elements are particularly relevant in the Xenakian approach in the piece: the construction of a Sixxen as part of the interpretation, the spatial disposition of the ensemble and the order of movements. These are three aspects that are specifically indicated in the score of *Pléïades*, with the composer himself utilizing more variants than initially stated. It will then be shown how these elements add more variety to the piece. At the same time, it will be addressed how this certain freedom allowed by the composer aggregates choice responsibility to the performers and implicates potentially diverse possibilities to perceive the piece.

### 8.1.1 The construction of a Sixxen as the starting point of the performance

As previously addressed, it is impressive that Xenakis essentially defined an innovative instrument in two paragraphs. This coherent synthesis defining a new musical object, deserves recognition and various innovative ideas could yet certainly emerge as a continuous challenge to the future generations.

This process implicates interpretative questions from the beginning, demanding a decision-making process that will directly influence all the later aspects of the performance. The construction of the object signifies that, depending on which choices are made, different interpretative perspectives emerge while others are immediately discarded. E.g., the disposition of the bars could be vertical by suspending them (as with gongs or bell plates), horizontal by arranging in one height (as with a vibraphone) or two (as with a marimba or a xylophone), or it could yet be a modulable system that provides different configuration possibilities for the performers. Each one of these examples affect specific sound qualities and has direct consequences on interpretative perspectives, strongly impacting the performance practices. The same phrase played in a vertical system with free suspended bars or in a horizontal one with a pedaling mechanism requires vastly different physical attributes (postural and gestural) and can provide different musical results in terms of articulation, resonance, sound projection and others. It is impossible to react the same way in both systems and to conceive an equal aural result using so discrepant musical objects.

Factoring in the size of the bars, the type of metal and the type of mallets used, it is clear that each performance and resulting sound will be unique. As a result, the responsibility with which each ensemble engages itself in the construction of its own Sixxen determines the product, as well as what could be offered to different composers when commissioning new pieces. Xenakis was conscious of this approach and, as previously mentioned, he stated that "The percussionist must engage his entire body in the aspects of sound production. The percussionist must be involved in the invention and manufacturing of new instruments."[2] (Yoken, 1990, p. 54). Inserting the percussionist in the equation, Xenakis was certain that a better product would be constructed by the knowledge in direct context with the context of the performance. In this way, the fact Xenakis never indicated a comprehensive design plan allows musicians to address the issue in their own way. Granting artistic freedom to achieve a personal project in terms of the final object and its sonority, the composer places responsibility on the musicians. Xenakis wanted to assure that the practice result would be guiding the design of the object, and that the entire process of construction would be dependent on the point-of-view of the performer.

[2] The entire statement is: "The percussionist must engage his entire body in the aspects of sound production. The percussionist must be involved in the invention and manufacturing of new instruments. With artistic integrity, the percussionist should work closely with industry to create these new instruments. Unfortunately, today commercial instrument manufacturers are not interested in this development." (Yoken, 1990, pp. 54-55).

The construction of a Sixxen is thus a conditional part of the interpretative approach on *Pléïades*. It is not only tied to the movements in which the instrument is required («*Métaux*» and «*Mélanges*»), it also connects the other two, by comparison. The SIX-XEN gives a new meaning to the percussion keyboards and the drums in «*Claviers*» and «*Peaux*». Depending on the conceived sonorities and physical constitution, the SIX-XEN could bring new meaning to the other instrumental set-ups. In this way, if the musicians use specific pitches to base their Sixxen prototype, the result is somewhere between the pitched and unpitched instruments (Fig. 8.2). This was the approach developed e.g. by Pedro Carneiro (Portugal), or by the Giannini Swiss Drums for the *Zürcher Hochschule der Künste* (Switzerland). If the constructor instead tends towards a "noisy" setup for their Sixxen prototype, it could occupy the extreme of this balance between pitched and unpitched instruments, an approach that was the main objective of the Impact(o) ensemble (Brazil).

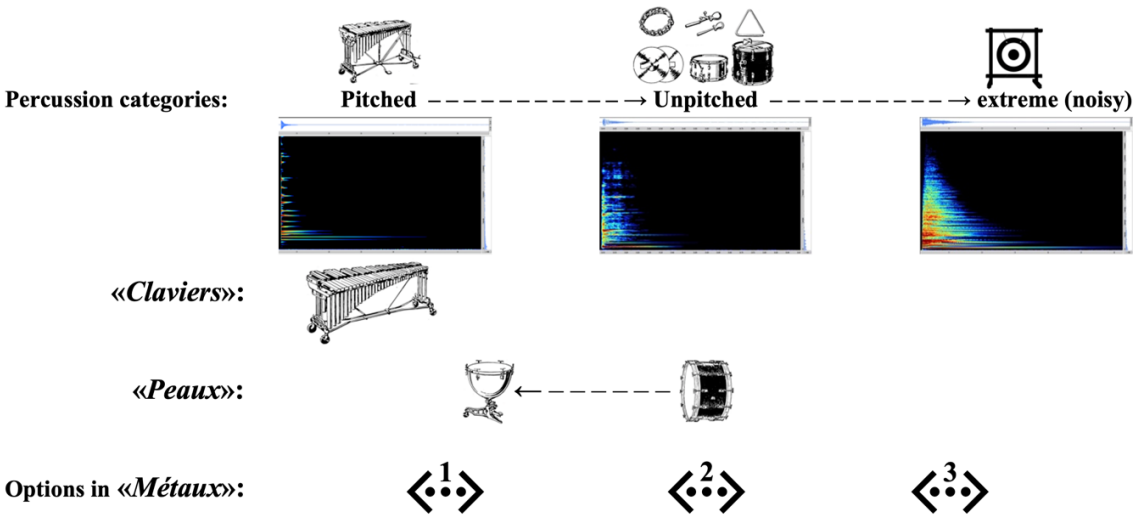



***Figure 8.2***. Possible ways to design the SIX-XEN before constructing it. Based on some references on specific pitches or scales (< 1 >), without references (< 2 >), or in an even more inharmonic extreme of the possibilities (< 3 >).

In Position 1 of the image above, the SIX-XEN could be perceived as an intermediary category between pitched and unpitched instruments, creating an amalgam between «*Claviers*» and «*Peaux*». In Position 2, it could be perceived as an extension of the instruments of «*Peaux*», an expansion of this category, but increasing the dimension of the melodic aspects found in fast passages of «*Métaux*». In Position 3, the SIX-XEN would be characterizing a different category and could be considered in the total opposite of «*Claviers*». In any of these positions, it is certain that «*Mélanges*» has multiple conditions to exist and to represent the amalgam of the sonic entities that results from constructive choices. It is through this lens that the SIX-XEN defines «*Métaux*» and redefines the other movements and by way of its construction, it has the potential to create more connection or separation between these movements. Therefore, the SIX-XEN is the core of the piece by having a focus on its sonic constitution, and can provide endless possibilities for construction and performative approaches. In any of these possibilities, the SIX-XEN would be an "in-between" instrument, breaking frontiers and

boundaries to enlarge the timbre spectrum of the piece. In any of the methods to construct the instrument, it is evident that Xenakis was interested in building a polymorphic instrument, an object with plural potential meanings and conditions to exist. Regardless of the final constitution (and the possibilities are extremely varied), the musical object transcends the limitations of one unique category of acoustic instruments.

The construction of a Sixxen is an essential step of the decision-making process in *Pléïades* and, because there is an opening object to be qualified, Xenakis continues to impose an enormous responsibility from the beginning of this process. The ensembles are able to borrow, purchase, or to rent a Sixxen that they did not construct. However, the responsibility that Xenakis gave to the musicians and that is present each time an ensemble wants to perform the piece, is fundamental in the process and is crucial to the main concept of the piece: diversification and variability. The resulting diversity is a keystone of the process and highlights that each new Sixxen is the pinnacle of the ensemble's conception of percussion timbre and innovation, as well as an irreplaceable contribution to the Xenakian universe of sounds that *Pléïades* can manifest. Through this, the instrument constructed is also a representation of the ensemble itself. There is a triple-mirroring phenomenon between Xenakis, the Sixxen constructed and the ensemble responsible for its construction, with each one reflecting part of the other and representing a relationship between the composer and the percussion community through an instrument of diverse possibilities. A Sixxen is thus consequent of many interpretative interests and, when its construction is complete, other challenges and choices to perform *Pléïades* appear, as it will be discussed below.

### 8.1.2 Disposition on the stage

For Xenakis, the performance space as a musical element was fundamental; these considerations included the instrumental disposition, the listeners' positioning and the aspects of the audience immersion in the sonic space. According to his autobiography: "In Beethoven's symphonies, for example, there is no reason to be outside the sound space. And in general, I don't like to see the orchestra in a frontal position, which forces the listener to remain outside the music."[3] (Xenakis, 1980, p. 228). This crucial decision about performance space brought a possible connection to profound concerns that the composer had regarding his audience[4].

Due to the instrumentation demands of *Pléïades*, the specifications of an available performance space must be considered. The primary focus are the interpretative aspects of the spatial disposition

[3] "Dans les symphonies de Beethoven, par exemple, il n'y a aucune raison d'être à l'extérieur de l'espace sonore. Et de manière générale, je n'aime guère voir l'orchestre en position frontale, ce qui oblige l'auditeur à rester en dehors de la musique." (Xenakis, 1980, p. 228).

[4] This is why a special attention was given in all concerts organized during this research work, including the public in different instrumental dispositions.

of the instruments and the aural information that the audience receives by the different potential organizations on stage, aspects of which could relate to the Indonesian traditions that Xenakis encountered. Xenakis (1979, p. ii) initially expressed concerns about stage position in the original score:

> Interpreters should be placed either in the center of the audience, on a higher platform, thus being surrounded by the public, or on a platform placed in front, facing the spectators.
>
> Interpreters A, B, C, D, E, F
> ---
> audience
>
> In the first case (in the center of the audience), the metals (SIXXEN) should be placed in the middle of the other percussion instruments. In the other case, the SIXXENS should be placed in such a way as to best serve the performance.[5]

The composer prioritized the spatial layout surrounded by the public but gave consideration to the SIXXEN placement. The first group to work with Xenakis adopted both dispositions over time (Fig. 8.3). They initially used the circular disposition from the instrumental premiere in 1979 but also adopted the frontal disposition, alternating between both according to the event proposed and the space available.

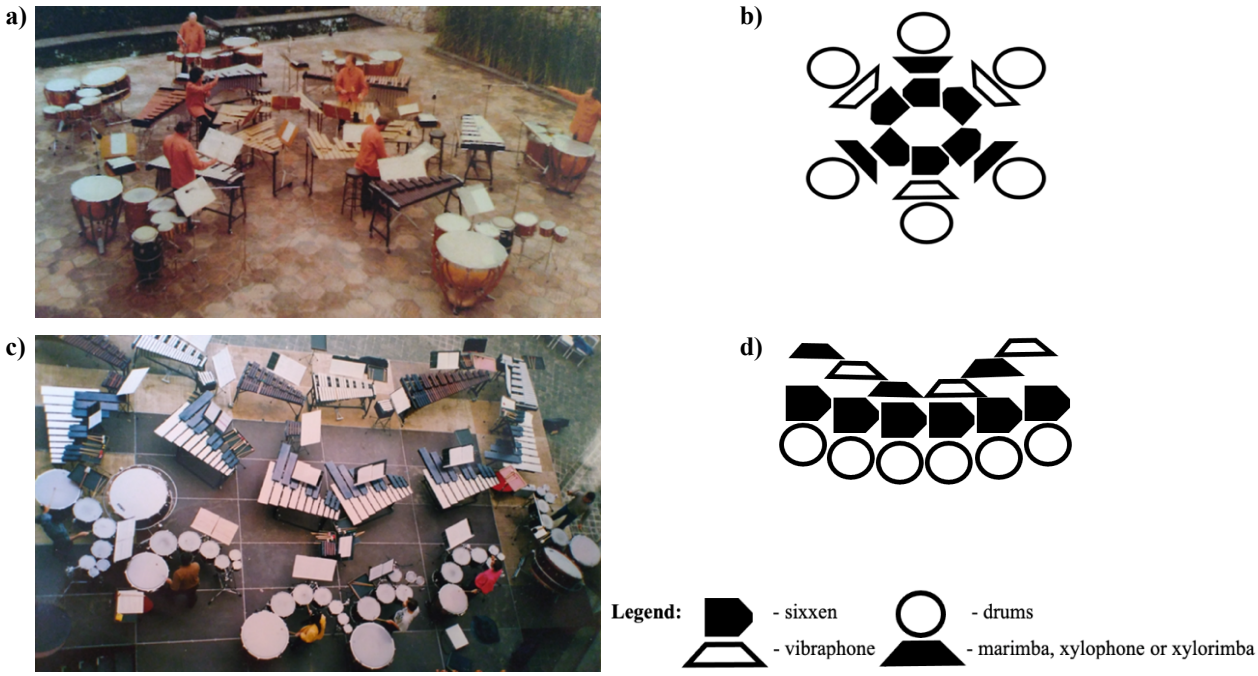



***Figure 8.3***. The two instrumental dispositions proposed by Iannis Xenakis in the original score of *Pléïades*. **a)** Circular disposition. Source: © LPSA. **b)** Schematic figure of the circular disposition. **c)** Linear disposition. Source: © LPSA. **d)** Schematic figure of the linear disposition.

[5] "Les interprètes devraient être placés soit au centre de l'audience, sur une estrade surélevée, étant ainsi entourés du public, soit sur une estrade placée en avant, faisant face au public.

Interprètes A, B, C, D, E, F
---
public

Dans le premier cas (au centre de l'audience), les métaux (SIXXEN) devraient être placés au milieu des autres instruments de percussion. Dans l'autre cas, les SIXXENS devraient être placés de telle sorte à servir au mieux l'interprétation." (Xenakis, 1979, p. ii).

Xenakis also considered different ways to install the set-ups and present the piece, even if not found in the score; for instance, in his personal notes, he indicated a possible disposition of the instruments to play all the movements (Fig. 8.4a). The drawn scheme proposed a frontal disposition of the musicians, but in a way that could place the Sixxen at the center of the stage, surrounding by the rest of the instrumentation. However, there is no evidence that a group that worked with Xenakis organized the stage in this perspective. Thus, even if some information is missing, these personal notes indicate a third possible disposition of the instruments to play all the movements. The Sixxen, as required by Xenakis in the circular disposition, is primarily at the center surrounded by the mallet instruments of «*Claviers*» and finally both surrounded by the drums of «*Peaux*» (Fig. 8.4b). However, different dispositions were adopted by Les Percussions de Strasbourg (Fig. 8.4c and d).

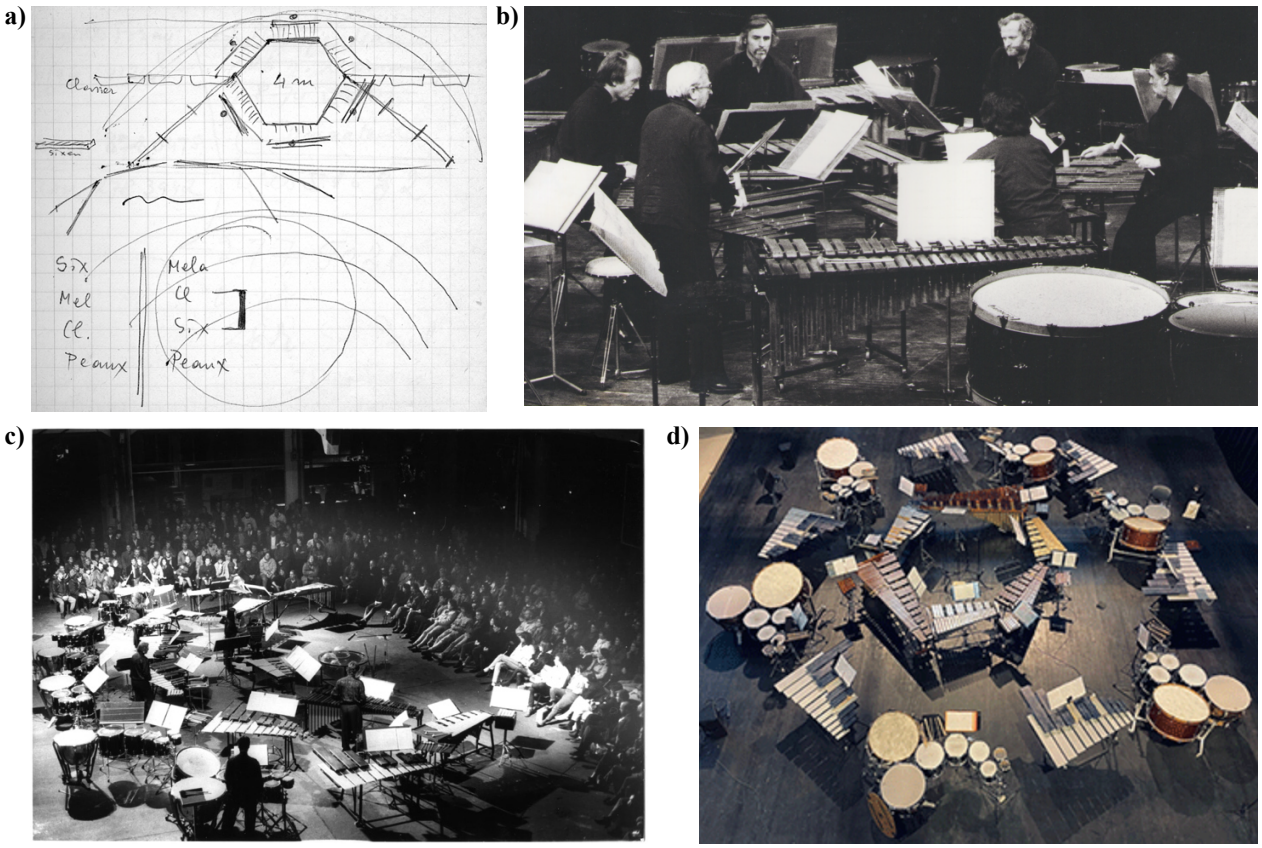



***Figure 8.4***. Different instrumental disposition in *Pléïades*. **a)** Disposition of instruments in a personal note by Iannis Xenakis. Source: © Famille I Xenakis DR. **b)** Circular disposition (instrumental premiere in 1979). Source: Gabriel Bouchet's personal archives. **c)** Linear disposition (1980s). Source: © LPSA. **d)** Circular disposition (2020s). Source: © LPSA.

As Xenakis' preferred proposition, the circular disposition has contrasting characteristics when compared to *Persephassa* (Fig. 8.5a), with both pieces implicating circular relation to the public. However, while the audience is located within the circle of instruments in the first example, in the other the audience surrounds the group during the performance (Fig. 8.5b). In *Persephassa*, this was imposed without other suggestions while in *Pléïades* this is presented as the first but not only

possibility. In *Persephassa*, the circular disposition is even a *sine qua non* condition to play the piece because the main compositional approach tied to the sound movements that occur all over the piece relies on this positioning. The sound movements, influenced by electroacoustic music on Xenakis acoustic works, are a fundamental part of *Persephassa,* being impossible to perceive the main aspects of the compositional thinking without the public in the center. In fact, the entire final section (from meas. 352) was composed placing the listener in the center of complex structures of timbres (rings of sounds) that turn in different directions. This fundamental aspect of the tridimensional localization of sounds is significant in *Pléïades* because he composed many types of sound movements and clearly noted different effects of spatialization throughout the piece. However, with the circular disposition as initially emphasized in the score, he stimulated another type of aural perception.

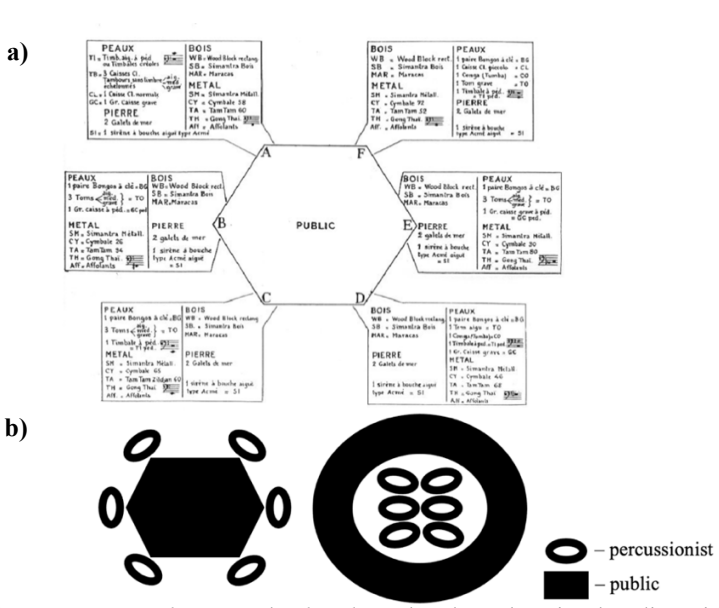



***Figure 8.5.*** A comparison between *Persephassa* and *Pléïades* related to the circular disposition. **a)** Details of the instruments and the disposition in *Persephassa*. Source: *Persephassa* (1969) – © Éd. Salabert. **b)** Schematic figure comparing the circular disposition of instruments in *Persephassa* (left) and *Pléïades* (right).

A mix of both configurations could even establish a particular stage (Fig. 8.6). A great space would be required depending on anticipated public turnout and the intended listeners' perception. A large concert space should be available to organize all the material in both pieces, with the public placed between both installations. Even if demanding in terms of instrumental disposition, this layout would prove feasible to accomplish and stimulating for the audience.

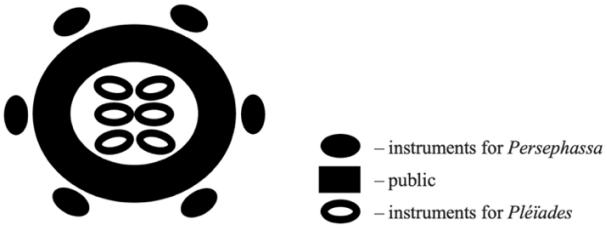



***Figure 8.6.*** A schematic figure of the circular disposition to present *Persephassa* and *Pléïades* at the same concert.

At one point, the composer tried other possibilities. During the premiere of *Taurhiphanie* (see Chapter 4 for more details), he proposed a stage configuration that established different strata with listeners inside and outside the instrumental installation (Fig. 8.7). This use of different layers showed the malleability with which Xenakis treated the subject enabling the percussionists to create new stage dispositions. This could show that the composer allowed the use of a circular disposition for *Pléïades* with the public inside the instrumental ring, even if this was not previously mentioned in his score.

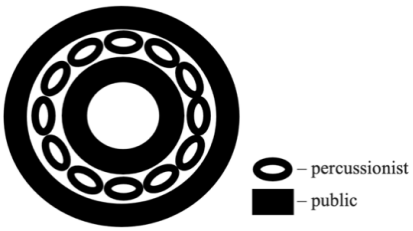



***Figure 8.7.*** Circular disposition to present *Pléïades* with twelve musicians during *Taurhiphanie* (1987).

The above indicates that three dispositions were accepted by Xenakis for *Pléïades*: internal circular, frontal and external circular (Fig. 8.8). The two first dispositions are mentioned in the original score and the third one is the consequence of a practical approach that he used during the spectacle *Taurhiphanie*.

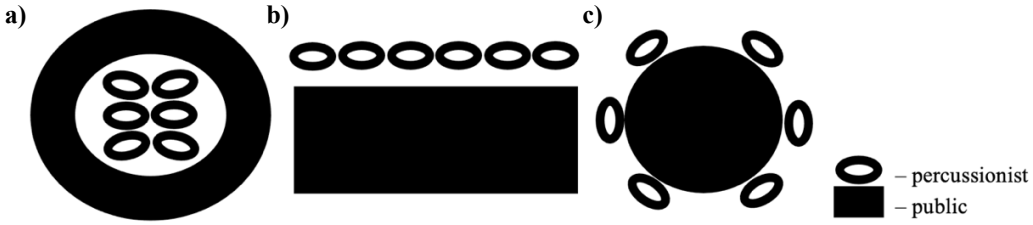



***Figure 8.8.*** The schematic figures represent potential instrument dispositions in *Pléïades*. **a)** Internal circular disposition. **b)** Frontal disposition. **c)** External circular disposition.

In terms these possible dispositions, a diverse aural experience can be presented to the audience. The internal and external circular dispositions produce an aural phenomenon in three dimensions, and the positioning of the listener in relation to the sound sources could then allow the effects of depth and spatial displacement (either approaching or distancing). The frontal disposition, on the other hand, grants the listener a more stereo effect, and the sounds move in lateral directions more prominently than the two previous dispositions. An effect, such as indicated in Fig. 8.9, is manifestly different for each disposition and could allow completely different experiences by the listeners.

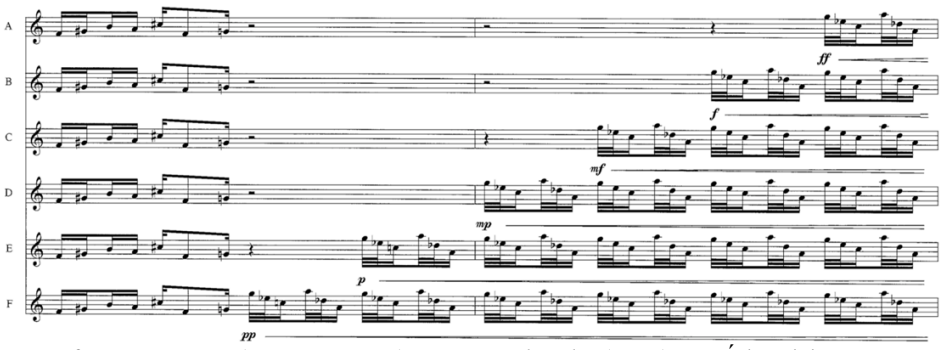



***Figure 8.9.*** Excerpt from «*Métaux*» (meas. 139-140). Source: *Pléïades* (1979) – © Éd. Salabert.

An internal circular disposition allows a listener (placed outside the musicians' circle) to have the impression of a tridimensional localization of sound but in a more frontally concentrated environment. The effect produced by the above excerpt transmits through the concert hall, but with an impression of frontal depth with the listener not included in the sound trajectory. In an external circular disposition (with the listener surrounded by the sound sources), the same excerpt allows a different tridimensional experience by including the listener in the middle of the movement of sounds, where he is embraced by the sounds, being part of the sound trajectory. In the frontal disposition, the excerpt is perceived as a lateral movement represented by the passage from right to left, where the depth is not the main point and the listener not included in sound trajectory. This is just one example of spatial effect composed by Xenakis, and there are more excerpts in the score that represent sound displacements of different qualities. This shows that thinking in the disposition of the instruments is fundamental to the performance of Xenakis' pieces.

### 8.1.3 Order of movements

With a relative freedom given by the composer, the order of the movements can be rearranged in different sequences. It is then clear that each sequence could bring a new idea in terms of hearing experiences and timbre association, being thus an interpretative choice pointing to different perspectives. In terms of possibilities, this is a factorial of four (4!) that could spawn 24 different sequences. However, the original score formally indicated two possible sequences. The first one is characterized by the sequence of movements as published («*Claviers*», «*Peaux*», «*Métaux*» and «*Mélanges*» essentially). The second one, as Xenakis explicitly described, has a format where "the order of the sections can be the following: MELANGES CLAVIERS METAUX PEAUX"[6] (Xenakis, 1979, p. iii). However, even the premieres of *Pléïades* (as a ballet and as an instrumental piece) and the subsequent performances had not presented the same order. It changed almost in each new

[6] "L'ordre des sections peut être le suivant : MELANGES - CLAVIERS - METAUX - PEAUX." (Xenakis, 1979, p. iii).

presentation even considering only Les Percussions de Strasbourg at the end of the 1970s and during the 1980s (Table 8-1).

***Table 8-1***. Order of movements of *Pléïades* adopted during the 1970s and 1980s.

| **Dance libretto 1979** | ***Le Concile Musical* 1979** | **Instrumental version 1979** | ***Le Concile Musical* 1983 and 1984** | ***Taurhiphanie* 1987** |
|---|---|---|---|---|
| «*Claviers*» | «*Mélanges*» | «*Mélanges*» | «*Métaux*» | «*Métaux*» |
| «*Peaux*» | «*Claviers*» | «*Claviers*» | «*Mélanges*» | «*Claviers*» |
| «*Métaux*» | «*Métaux*» | «*Métaux*» | «*Claviers*» | «*Peaux*» |
| «*Mélanges*» | «*Peaux*» | «*Peaux*» | «*Peaux*» | «*Mélanges*» |

Observing the list of recordings, it is evident that each group has their own sequence of movements (Table 8-2). Even the groups that directly worked and exchanged with Xenakis (Les Percussions de Strasbourg, Les Pléiades and Kroumata) do not adopt a unique sequence possible.

***Table 8-2***. Sequence of movements adopted in recordings by different groups.

| **Year** | **Ensemble or artist** | **Album** | **Movements** |
|---|---|---|---|
| 1986 | Makoto Aruga Percussion Ensemble | Iannis Xenakis – PLEIADES<br>Josep Soler – Noche escura | «*Mélanges*» «*Claviers*» «*Métaux*» «*Peaux*» |
| 1987 | Les Percussions de Strasbourg | Iannis Xenakis – Pléiades | «*Mélanges*» «*Métaux*» «*Claviers*» «*Peaux*» |
| 1989 | Les Percussions de Strasbourg | Iannis Xenakis – Pléiades | «*Mélanges*» «*Métaux*» «*Claviers*» «*Peaux*» |
| 1990 | Kroumata | Iannis Xenakis | «*Métaux*» «*Claviers*» «*Mélanges*» «*Peaux*» |
| 1992 | Les Pléiades<br>Sylvio Gualda (dir.) | Iannis Xenakis – Idmen Pléïades | «*Mélanges*» «*Claviers*» «*Métaux*» «*Peaux*» |
| 1995 | Brake drum percussion | Iannis Xenakis – Pléïades<br>Akira Nishimura – Ketiak | «*Métaux*» «*Claviers*» «*Mélanges*» «*Peaux*» |
| 2007 | Red Fish Blue Fish<br>Steven Schick (dir.) | Xenakis percussion works | «*Mélanges*» «*Claviers*» «*Métaux*» «*Peaux*» |
| 2015 | Slagwerk Den Haag | SIX | «*Métaux*» |
| 2015 | Kuniko Kato | Iannis Xenakis | «*Mélanges*» «*Métaux*» «*Claviers*» «*Peaux*» |
| 2016 | Synergy Percussion | Xenakis: Pleiades | «*Métaux*» «*Claviers*» «*Mélanges*» «*Peaux*» «*Mélanges*» (extra version) |
| 2019 | DeciBells | Pléïades by Iannis Xenakis | «*Claviers*» «*Peaux*» «*Métaux*» «*Mélanges*» |
| 2022 | Les Percussions de Strasbourg | Xenakis: Pléiades & Persephassa | «*Mélanges*» «*Claviers*» «*Métaux*» «*Peaux*» |

Each possibility could emphasize a specific aspect and form a narrative that put in context the timbre relations created during the sequential discourse. If «*Mélanges*» is the first movement, this position can represent an important information, because it would determine that the listener will initially perceive all the timbres gathered before listening to the monotimbral movements. In this case, the movement is an anticipation of themes, motives and sonic structures, presenting all three categories of instruments together. After initially hearing the gathering of timbres and structural materials, the listener becomes focused on each type of timbre. On the other hand, if «*Mélanges*» is presented as the last movement, there is a narrative of materials considered separately that will only be heard as an aggregate at the end. Thus, only after the sequence of monotimbral movements will the listener perceive their polytimbral associations, and «*Mélanges*» represents a conclusion. It is evident from the previous tables that, even if rare, «*Mélanges*» has also been used as a central movement, either in the second or third position. In both cases, the choice seems to emphasize the movement that remains isolated in these options. Thus, when «*Mélanges*» is presented as the second movement, the narrative focuses on the relationship with the first movement, as if it had a prominence in relation to the others. This occurs, for example, in the sequence «*Métaux*», «*Mélanges*», «*Claviers*» and «*Peaux*» (used during the re-performances of *Le Concile Musical* in 1983 and 1984), where «*Métaux*» is the special focus because it is the movement that opens the sequence and is thus separated from the other two monotimbral movements. In the sequence «*Métaux*», «*Claviers*», «*Mélanges*» and «*Peaux*» (used in the Brake drum percussion group recordings), the position of the third movement highlights what comes next, separating «*Peaux*» which has then a concluding character.

Another element that can imply an interesting narrative discourse is in the relations of the three monotimbral movements. Taken separately, they can emphasize a discourse based on the progression of timbre changes and pitch-to-noise transformations. Thus, a «*Claviers*», «*Peaux*» and «*Métaux*» sequence (as presented in the original score) starts with the monotimbral movement with percussion keyboards and emphasizes pitch characteristics to go progressively through instruments of undefined pitch (as in «*Peaux*» and «*Métaux*»). Another aspect would be the passage starting with predominantly melodic elements that turns to predominantly rhythmic elements with «*Métaux*» as a transition between both extremes (as in the sequence «*Claviers*», «*Métaux*» and «*Peaux*»). These three movements can be associated in six possible sequences (result of the factorial of three–3!), so that the interpreter will be able to find the sequence that justifies his approach and understanding of *Pléïades*.

Finally, it is important to consider which movement will conclude the presentation of the piece. As seen in Tables 8-1 and 8-2, «*Peaux*» presents a notable prominence as a concluding position. The groups end the concert with the energy that the drums embody. This last position is also occupied by «*Mélanges*» and «*Métaux*», but very rarely by «*Claviers*». In all the perspectives above mentioned,

the construction choices can be extremely important to reinforce the coherence of one order or the other. An ensemble conscious of the choices that determined the characteristics of their Sixxen can take advantage of its specificities and subtleties to imagine the sequence when performing the movements.

It is also clear that a concert could present *Pléïades* with other pieces interspersed between the different movements. This was effectively the case in *Le Concile Musical* and also why Xenakis composed the piece as four movements. The original idea was to have a piece with four movements that could establish some sort of dialogue with another piece (originally antiphonal music by Giovanni Gabrieli–more details in Chapter 2), allowing for an alternating disposition. Thus, new dialogues between Xenakis and other composers could be the subject of a new artistic proposition. The sequence of movements of *Pléïades* could fit differently in relation to the other pieces presented in the same concert. This freedom is again evident, being a responsibility that Xenakis passed to the interpreters on the results of their own decisions. A constant revitalization and re-signification of the piece by new ways of presentation is one of the many paths that this responsibility stimulates.

### 8.1.4 Indonesian connections: a search for imaginative perspectives in the creative process

Some connections between the potential creative process in *Pléïades* and Indonesian music practices will be highlighted below. Xenakis' references and the imaginative perspective that his composition and instrument suggest in relation to Indonesian music are potential sources of artistic development to build new prototypes, to propose specific ways to interpretate *Pléïades* and to perform new pieces. Attentively evaluated and placed in a broader perspective of Xenakis' thinking, a complete creative process emerges based on these elements.

#### 8.1.4.1 Construction choices

Regarding the construction of a Sixxen, aspects tied to Indonesian music could stimulate new prototypes, new designs and the use of new types of materials. The gamelan instruments are constructed with a traditional process older than a thousand years being even something that Xenakis himself considered positive[7]. This traditional mastery on the timbre and frequencies inspired aspects of *Pléïades*, because of Xenakis' experience of hearing the gamelan and the resulting sonic qualities. In this way, still respecting all indications required by the composer, a Sixxen could be built with metallic material and resonators similar to those used in gamelan instruments. The metal generally implied to construct Indonesian instruments is bronze. This could be the material for a specific prototype because until now a predominant constitution of aluminum is perceptible with only one

[7] As expressed in some interviews (Restagno, 1988; Varga, 1996), and better addressed in Chapter 3–Section 3.1.4.

constructed with bronze as part of the bar constitution (as further discussed in Chapter 10–Sections 10.1.1 and 10.2.1).

The bar profiles, which are diverse in gamelan instruments and that allow very specific harmonic stimuli, could also reinforce these potential Indonesian sonorities in the constitution of a Sixxen prototype, stimulating research on new materials. It is clear that the shapes of metallic bars constructed for Sixxen are essentially channel or inverted-U (with equal or unequal sides), tube (square, rectangular or round), flat bar and angle or inverted-L. However, bar profiles in gamelan instruments could bring new perspectives on timbre and the frequencies implicated in a specific sound spectrum. The Indonesian instruments are not all homogeneous and constructed the same; quite the opposite, they reflect some particularities of each region, village and each constructor's tradition. In this sense, this diverse environment brought new ideas for percussionists. Considering just a few Indonesian instruments (Fig. 8.10), the perspectives are large and they could be applied to the construction of Sixxen prototypes and research on bar profiles.

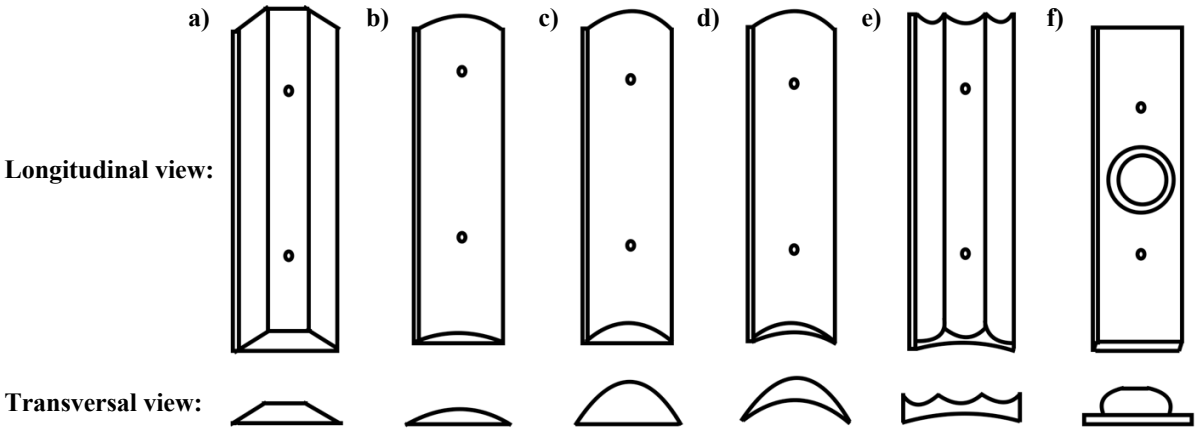



***Figure 8.10.*** Different profiles representing the bars of Indonesian instruments. **a)** Low bars of gangsa. **b)** Low bars of saron demung. **c)** High bars of saron panerus. **d)** Medium bars of saron. **e)** Bars of gender. **f)** Bars of slentho.

In the example, only six instruments are shown, but they already demonstrate the vast source of ideas that represent the organology of gamelan instruments. The mastery of the tridimensional characteristics of these specific bars is impressive and very demanding in terms of knowledge and skills to be developed. These forms were clearly developed to stimulate specific harmonics and to develop a particular timbre result, which is consciously and constantly considered and evaluated by the Indonesian constructors. Xenakis personally tested and played some of these instruments and was convinced by their sound properties and aural qualities (see more in Chapter 1–Subchapter 1.2). The six examples above are specifically tied to bar profiles played horizontally; the suspended plates and gongs played vertically are not even mentioned here. The fact can assure the vast diversity of frequency and timbre phenomena that could be stimulated and experimented in a new Sixxen by a methodical evaluation of the instruments that inspired Xenakis when creating *Pléïades*.

Respecting the frequential differences indicated by Xenakis, one could build a prototype in which the intervals are based on a specific gamelan set. Thus, a Sixxen could emerge based on a tuning and a pitch collection characteristic of a specific gamelan. A repertoire with this Sixxen and the original gamelan set could be developed and would certainly present a high degree of sound correlations and equivalences for composers. Another potential source of pitch collection for the construction of a Sixxen could be the sieve that structures «*Claviers*», and the choice of excerpts from this sieve could base the search of frequencies. This suggestion could even strengthen the cohesion between the different movements «*Claviers*» and «*Métaux*», reinforcing the sonic aggregation of certain passages of «*Mélanges*» because of the correlation between the percussion keyboards and the Sixxen constructed in this way. This use of the sieve can take many forms, either by using part of the sieve (only the bass, middle or treble region) or by using the sieve in a more complete way (for example, with the first half of a Sixxen correlated to an intervallic succession of the sieve such as P1 and the second half correlated to another intervallic succession such as P3). Percussionist and international soloist Pedro Carneiro accomplished a project producing a prototype in this perspective. He described the attempt to construct a parallel between the Sixxen frequencies and the original sieve, and stated that: "we use this patch from Max[/MSP] for tuning, compressing scales with *Jonchaies* gamelan 'flavor', but compressed with the same ratio and smaller range"[8] (Pedro Carneiro, email to author, March 25, 2022). Emerging from the Indonesian perspectives in Xenakis' work, many other ideas, experiments and projects are possible.

#### 8.1.4.2 Articulation, attack properties and timbre choices

In the present chapter, different perspectives are considered to open the imagination to a performative approach. In this way, a stimulating element for the interpretation development is the definition of attacks when playing «*Métaux*». Thus, the use of mallets, hammers and/or other objects is equally a subject with several potential ramifications. Based on the indications of the composer himself and the discussion of the previous chapter, one could use different mallets from gamelan sets for the interpretation of different sections of *Pléïades*. The changes of mallets could reinforce section changes or timbre alteration to emphasize some structural aspect. In a prototype designed with a metal type or a bar profile similar to that of a gamelan, these choices of mallets and hammers could further highlight particular aspects of Xenakis' original creative process and still respect the indications he gave in the introduction of the piece. This conscious use of gamelan hammers was already made by the Percurama Percussion Ensemble, a Danish group coordinated by Gert Mortensen[9].

[8] "[...] usamos este patch de Max para a afinação, comprimindo escalas com o "sabor" gamelan de Jonchaies, mas comprimidas com o mesmo rácio e âmbito menor" (Pedro Carneiro, email to author, March 25, 2022).
[9] As better discussed in Chapter 10–Section 10.1.7.

The aspects of hand dampening (a virtuosic skill in gamelan traditions) could also influence the articulation of certain sections, particularly with a type of phrasing based on Indonesian traditions. This would be possible in different excerpts of «*Métaux*» (some examples are presented in Fig. 8.11).

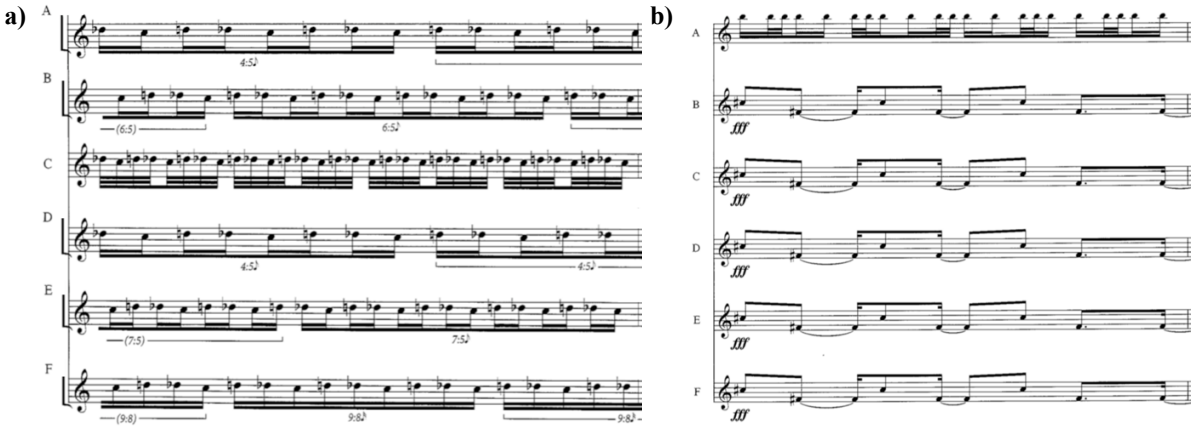



***Figure 8.11.*** **a)** Excerpt from «*Métaux*» (meas. 26). Source: *Pléïades* (1979) – © Éd. Salabert. **b)** Excerpt from «*Métaux*» (meas. 35). Source: *Pléïades* (1979) – © Éd. Salabert.

The differences between both types of instruments are clear in terms of dampening; while the gamelan keyboards[10] generally have one row of bars, the Sixxen, generally, have two[11]. The fact that the instruments are constructed in Indonesia with one row allows a much faster and precise hand dampening technique, of which would be more difficult with two rows. Therefore, «*Métaux*» presents many passages that are demanding and make a precise application of a hand dampening almost impossible. However, it has many other passages in which an elaboration of the dampening actions could implicate a complement on the narrative of an "Indonesian" sound quality of *Pléïades*, if desired by the musicians. In the first section of «*Métaux*» (partially indicated in Fig. 8.11a) a variable hand dampening could be applied. Certain excerpts could also implicate a gradation on dampening that would better delimit sections and subsections and make the musical discourse more dynamic. This is still an open field of interpretative possibilities to be tested and developed.

The use of animal or fiber skins on the drums could equally reinforce the search for certain "traditional" sonorities. The use of this type of drumhead could produce sonorities more correlated to gamelan. It is evident that the set of «*Peaux*» is in any way completely divergent of the drum sonorities generally used in Indonesia. However, this choice of specific skins could at least represent a context more appropriate in terms of a traditional membranophone timbres, stimulating an imaginary, a construction of significations and a sonority nearer to extra-European traditions.

[10] Such as jegogan, calung, kantilan, gangsa in Balinese music and saron, gender, slenthem in Javanese music.
[11] See more details in Chapter 10–Section 10.1.3.

#### 8.1.4.3 Repertoire choices

Another aspect of the Indonesian connections could point to repertoire choices and the development of new pieces. One could then imagine artistic projects that establish and emphasize a dialogue between the gamelan and Xenakian music. *Pléïades* is a fundamental piece for this, but many other works could stimulate concerts in which Indonesian music and Xenakis' repertoire have a certain dialogue. It is even possible to imagine that pieces heard by Xenakis in Bali and Java could be performed alongside his own works. In the perspective of *Jonchaies* and *Pléïades*, different pieces have some traits by consequence of his Indonesian journey such as *Retours-Windungen* (1976), *Palimpsest* (1979), *Aïs* (1980), *Komboï* (1981), *Nekuia* (1981), and *Idmen A B* (1985), among many others. A concert proposing such a dialogue can present interesting perspectives.

Another aspect of the repertoire to be explored concerns the premieres of new pieces. The dialogue between the SIX-XEN and gamelan could be established as a proposition of material in which composers can work associating sonorities between both instrumental sets. This specific aspect was the main objective of part of the present artistic research work as it will be addressed below.

## 8.2 Practice and research, research and practice: a creative process through the SIX-XEN

My artistic proposition was greatly tied to two aspects that were stimulated by the research about Xenakis and the SIX-XEN: the idea that a historical repertoire must be continually performed to stay relevant and the understanding that a new repertoire produces important connections between performers and composers, perpetuating the existence of an instrument while developing its sonorities, its performance potential and its specific techniques. These historical perspectives on percussion repertoire were also the main objective of Devenish (2015) who did not focus on an exclusive instrument, but rather on the percussion development in a specific country. She masterfully addressed these aspects focusing on the Australian percussion ensembles, the tendencies they followed, the pieces they created and the innovative instruments they constructed. In addition, a great part of my artistic proposition was dedicated to the creation of new pieces in keeping with the tendencies of current compositional approaches, following the same line of thinking as Stene (2014) brilliantly emphasized in his work. The dialogue between past and present, through the connection of previous and current compositional approaches and literature for the instrument, reinforces the legitimacy of the SIX-XEN, and a broader understanding of it as an instrument could arise from the practice of its specific literature.

My practice-based research was possible through the *Hochschule für Musik FHNW*, an eminent institution focused on practice that offers the proper conditions to promote excellence in performance.

Furthermore, this organization has a complete Balinese gamelan set and a currently active gamelan group that offers classes, masterclasses, and events with weekly rehearsals. This was fundamental to the project, and the experience of playing in this gamelan brought significant contributions to the research. This experience reinforced the need of the discussion in specifically Chapters 1 and 7, and also giving direction to the analysis in the Chapter 6. The artistic development took place over four years and was presented in the form of four thematic concerts, adopting the following perspectives: the historical repertoire for the SIX-XEN, new commissions, the potential relationships between gamelan and a Sixxen, and Xenakis himself. Because a Sixxen (as well as a gamelan set mainly speaking) is an instrument of collective characteristics and chamber qualities, the pieces presented were predominantly for percussion ensemble, which required the participation and engagement of the percussion class of the *Hochschule für Musik FHNW*, under the direction of Prof. Christian Dierstein, and the ensemble Saraswara of gamelan gong Kebyar of the *Musik-Akademie Basel*, under the direction of Sara Andreacchio, Sigrid Winter, Martin Winter, and Carla Brazell. The presence of both ensembles in the structure of the institution was fundamental in providing new perspectives and practical propositions of the present research work.

To understand this approach and my increasing interest in this perspective, certain clarifications need to be made. I participated in Javanese gamelan workshops in Strasbourg (France) in 2012, at least a year and a half before imagining any project about Sixxen. Then, when I began to study the construction of a Sixxen, the aspects pointed by Xenakis and others in relation to the ties with Indonesian performative arts piqued my interest, even if the topic appeared anecdotal in research sources. This reference to the ties with Indonesian music and ensembles lacked detailed explanation and elaboration with documents and facts, and rather the topic was only mentioned with a few words and superficial speculations in the occasional articles, descriptions of the instrument, critiques or album booklets.

In my doctoral studies, I was interested in practicing a rarely presented gamelan repertoire specifically tied to avant-garde composers (notably John Cage, Lou Harrison, and James Tenney), that could be developed within specific conditions, and which were fortunately all present at the *Hochschule für Musik FHNW*. Exchanging with the directors, we had decided on Sixxen and *Pléïades* as the main subjects of the research, but what to focus on in this universe of possibilities was unclear. I knew that Xenakis had been influenced by traditions from all over the world, Indonesia being one of many. However, I was skeptical as to whether the composer's personal archives would corroborate these elements, and to which degree this was an important aspect of his production. I was concerned that trying to approach this project through the lens of extra-European traditions would produce another anecdotal research. Initially, I imagined that my interest in Indonesian instruments would be based on learning new techniques and repertoire; however, as I progressed in the analysis of Xenakis'

personal archives, I realized that these practical meetings around gamelan music were contributing to an essential understanding of the journey that Xenakis had made to the Southeast Asian archipelago.

I was learning, practicing and engaging with forms, structures and styles in gamelan, as well as the application of this music in other art forms (including dance, rituals and other traditions), and due to this fact, the context was clearer about the experience of the trip in Xenakis' life. Then, thanks to my participation and performance in the gamelan ensemble, a better comprehension of several parts of the letters, photos, texts, and recordings at the *Collection Famille Iannis Xenakis*, BLGF (*Bibliothèque musicale La Grange-Fleuret*), and at the BnF (*Bibliothèque national de France*) was possible. The more I was delving into the archival materials, the more apparent the connection with gamelan was with Xenakis' creative process. The analysis itself was another clear fundamental moment in which the practical experiences were an important tool to develop the research. Due to my personal experimentation with the repertoire, it was evident that some elements were directly or indirectly connected to gamelan traditions in *Pléïades* (in terms of texture, melodic patterns, interlocking rhythmic construction and instrumentation). The understanding of the *kotekan*, the colotomic instruments and structures, the requirement of a "hammer" to play the SIX-XEN as something similar to the *pangguls*, the sense of plurality, the instrumentation, as well as the understanding of the emphasis in metallic instruments in «*Claviers*» and «*Mélanges*», was pure consequence of my studies. Not even mentioning the two most direct connections between *Pléïades* and gamelan (the presence of a "*pelog*" scale in Xenakis' sieve and the end of «*Claviers*») because these materials surged in the archival research. However, they were only possible because I was playing Balinese repertoire, which motivated me to consider possible references of this canon in the composer's works. Through these studies, there is a new dimension about Xenakis and his production that is the purest consequence of a curious percussionist.

### 8.2.1 Concerts and repertoire

The performance aspect, from constructing the instrument to interpreting Xenakis' pieces and commissioning new pieces through the gamelan lens, was always at the very core of my personal interests. Thus, from my individual practice, a continuous feedback between gamelan practice and Xenakian studies came to light and progressively intertwined. I had practiced the gamelan, the Sixxen and *Pléïades* before dedicating myself to this research, tracing its theoretical implications in Xenakis' thinking and approaches. Upon further consideration, more perspectives can develop through my research. For instance, highlighting some parallels between the concerts organized and the research will explain the motivation to discuss Parts I and II. A short description of each concert, showing the intentions specifically developed for each one will now be addressed. The correlation between the

concerts and specific chapters will also be discussed to connect the artistic concepts and practices with the theoretical aspects that influenced them and to which they contributed.

#### 8.2.1.1 *Ein mikrotonales Universum von Klängen*

The first concert featured presented a selection of works for a Sixxen. It was conceived as an introduction to the instrument and its literature. It was important to stimulate an initial contact with the possibilities of the instrument that I had not experimented with before, through already-existing compositions (pieces that, excluding «*Métaux*», I had not played yet), pieces that were not yet premiered in Switzerland, and also the incorporation of a new work. Called *Ein mikrotonales Universum von Klängen* ("A microtonal universe of sounds"), the concert took place on December 9, 2019, and it was essentially a celebration of the 40th year of creation of the first Sixxen in 1979. I then sought to present an overview of established works in the repertoire for Sixxen starting from the interest in different forms of notation and aesthetic approaches of previous composers (see more details in Fig. 8.12).


***Figure 8.12***. Access to the additional documents and recordings of Concert 1: *Ein mikrotonales Universum von Klängen*. Link: *www.ronangil.com/doctorate-concert-1*

This concert featured a newly commissioned piece for Sixxen and gamelan called *Theta Carinae*, composed by Bertrand Gourdy. The piece offered me an interesting immersion in the comparative aspects of the two instrumental sets. A first comparative aspect was tied to the comparison between the frequencies, because Gourdy was interested to compose using the specificities of both set-ups. This comparison between the internal cohesion of the two tuning systems and the correlations between frequencies, ranges and passages of notes were a stimulating look inside the instrumental constitution. Even if the characteristics were certainly specific for the instruments observed (meaning that another Sixxen and another gamelan would create different constitutive

relationships), this internal observation focused my attention on their similarities and differences, which helped me observe how they could be acoustically described.

A second comparative aspect was the dimension of range of each instrumental set-up. Even if the specific Sixxen occupied a higher range and the gamelan was ample in the diversity of ranges for each instrument (considering jegogan, gangsa, calung, kantilan and gongs), this piece stimulated my imagination for how those aspects interested Xenakis when experiencing gamelan music and how this interest could characterize his potential interest in the Sixxens that he helped to construct. A third comparative aspect was the notation, because both instrumental set-ups have different conventional notations. Thus, the fact that to play them simultaneously required a constant changing in the logic of lecture helped me to understand the idiomatic dimension of each notation as well as the direct link with the practice of a chromatic disposition in two range of bars (with the Sixxen) and a continuous disposition in a unique range (with the gamelan). Therefore, understanding the idiomatic notation may mean understanding the musical instrument itself, its main characteristics, its known potential and its unexplored possibilities.

A final comparative aspect would be the beating effects of a gamelan and a Sixxen. I had personally always thought that this was a fundamental principle that could motivate constructive aspects and connect both Sixxen and gamelan. Working with Gourdy, these aspects seemed also important in quantitative terms (something all the time consciously searched by the gamelan traditional constructors) and it required a refinement of my hearing skills. Both acoustic/artistic and physic/mathematical principles brought a stimulating perspective to consider during the research, description of the instrument and the analysis when considering the integration of sixxens and vibraphones in «*Mélanges*».

This concert presented a contrasting opposition between the exclusive use of Sixxen (as in «*Métaux*» and *Venus* «*morning star*» by Rozalie Hirs) or its combination with other percussion instruments (*Four Meditations on the Stars* by Cassiopeia Sturm and *Theta Carinae*) or with piano (*Adelaide* by Kristina Warren). The repertoire also featured contrasting acoustic pieces («*Métaux*», *Adelaide*, *Theta Carinae*) and works with live electronics (*Four Meditations on the Stars*) or tape (*Venus* «*morning star*»). Some moments of the event can be visualized in the Fig. 8.13.

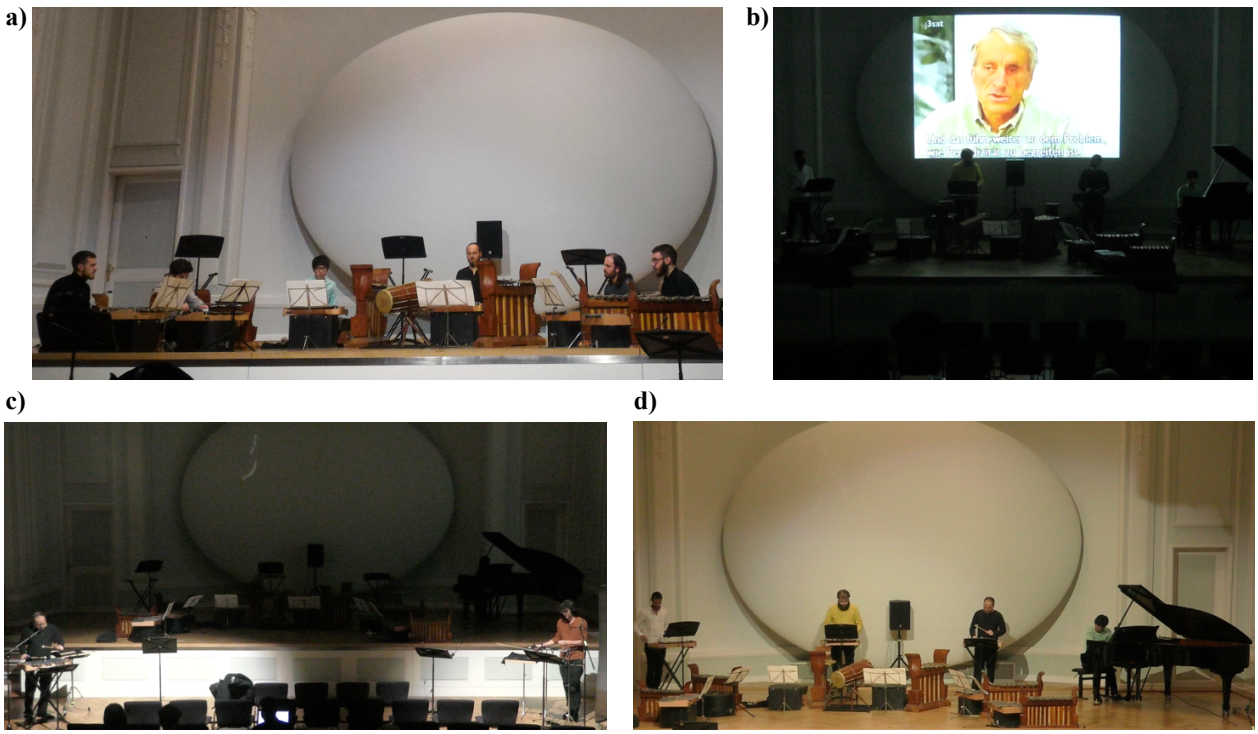



***Figure 8.13***. Performance during Concert 1. Source of all: Sarah Brabo-Durand.

Given the microtonal and non-tempered nature of Sixxen, the encounter between instruments of different tuning properties, such as between Sixxen and gamelan for *Theta Carinae* or between three sixxens and piano for *Adelaide*, played a central role in this program. I also sought to explore different forms of notation for sixxens, such as graphic notation in *Four Meditations on the Stars* or a mix between graphic and traditional notation, allowing individual choices in *Adelaide*[12]. The eclectic use of the Sixxen, either as a whole with its six parts («*Métaux*», *Venus* «*morning star*» and *Theta Carinae*), or as fraction of the instrument, such as three parts in *Adelaide* or only one in *Four Meditations on the Stars,* was another point in the repertoire.

In terms of historical issues, the repertoire established a dialogue between the first piece for Sixxen through Xenakis' «*Métaux*», and the most recent piece for the instrument, Gourdy's *Theta Carinae*. With the decreasing chronological order of the repertoire[13], the concert gradually delved into the past to honor Iannis Xenakis and the 40 years that separated the audience from the concert day to the first hearing of a Sixxen (on May 3, 1979). The concert thus began with the most recent piece and returned to the original that gave life and meaning to the instrument, presenting a retrospective of the diverse Sixxen literature. The choices in repertoire helped visualize the different ways the SIX-XEN was used, the certain adaptability that characterizes it and the different particularities that each composer highlights in his work.

[12] More information about those notation aspects can be found in Chapter 11–Subchapter 11.2.
[13] The sequence presented was: *Theta Carinae* (2019), *Four Meditations on the Stars* (2014), *Adelaide* (2013), *Venus* «*morning star*» (2010) and «*Métaux*» (1978-79).

The fact that the research addressed an in-depth review of the specific repertoire[14] increased the choice of pieces to be presented and broadened what to focus on during this concert. In this way, an important aspect of the concert was to highlight the notation for Sixxen in a practical context. Other fundamental perspectives for the performance were the historical context consulted in documents[15], highlighting the creation of the instrument in 1979 and the aspects related to the different percussion ensembles that worked with Xenakis.

It is thus necessary to discuss *Theta Carinae* because this piece was an impulse to a great change in the focus of the perspectives. The research about Xenakis and gamelan traditions was still in its inception, and the creation of *Theta Carinae* motivated me to search deeply into the aspects of the connections between these two. With the first contact made with the gamelan group in Basel, the rehearsals and experimentations especially for this piece, and the results with the Sixxen, as well as the potential applicability of the research about Indonesian performative arts became evident. Then, when consulting the recordings of the composer's personal collection (at the BnF), a direct link between *Pléïades* and gamelan emerged. Because of my initial interest in the Indonesian culture when hearing a specific recording (DONAUD 0602 218–Xenakis 223), the ascertainment that Xenakis used the same notes, texture, general rhythms and repetitive patterns in some of his work was a revelation. As highlighted by the recording date, as well as Xenakis' notes and comments, this recording could be related to one of his first *ex situ* encounters with Indonesian music in 1951. In fact, he regularly kept this tape in his collection all the time and listened to it while composing *Pléïades*[16]. After this realization, the organization of a second concert exclusively dedicated to the exploration of the potential connection between Sixxen and gamelan was deemed necessary and consequently was put into motion.

#### 8.2.1.2 *Ein polymorpher Dialog. Die Klangbegegnung zwischen Gamelan und Sixxen*

This concert united two instrumental groups from completely different musical contexts in a dialogue of complex timbres, with a set of gamelan from Bali on one side and a Sixxen on the other. It was an in-depth dive into the aspects that the first concert only initially touched upon and that could improve my understanding of both set-ups, their artistic interests and my own musical evolution. Because of this "meeting of differences", the concert was designated as *Ein polymorpher Dialog* ("A polymorphic dialogue", see Fig. 8.14). As we have seen in the previous subsection, this dialogue was motivated by evidence of relationships between Indonesian traditions and Sixxen that had emerged during the research. The creation of *Theta Carinae* during the first concert incentivized the second and motivated the commission of new pieces. Publicly presenting and explaining the Sixxens as well

[14] See Chapter 11.
[15] As addressed in Chapters 2 and 9.
[16] See more details in Chapters 1 and 7.

as the gamelan's characteristics to the composers, helped clarify many aspects of my research and give helpful insights about the creative process.

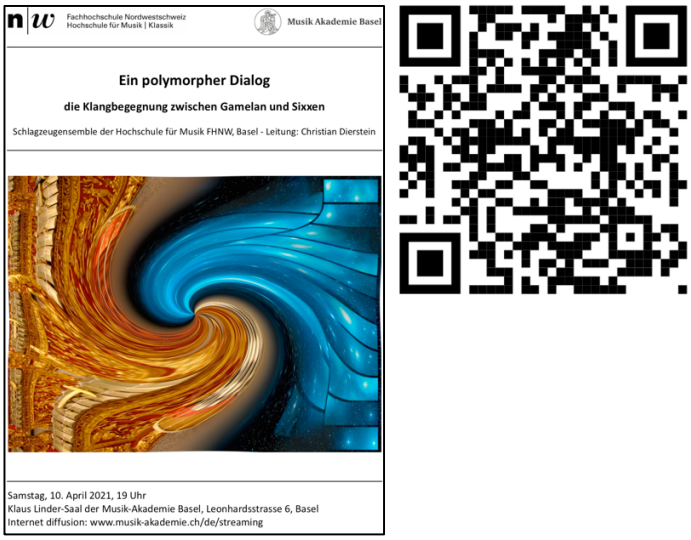



***Figure 8.14***. Access to the additional documents and recordings of Concert 2: *Ein polymorpher Dialog.* Link: *www.ronangil.com/doctorate-concert-2*

The aim was to play the Sixxen with the instruments that Xenakis strongly appreciated, along with the sonority and tuning of which were fundamental to his own concept of new acoustic instrument; in other words, the performance brought the Sixxen to its roots. Under these conditions, the presentation of a traditional piece was interesting to complete the repertoire of this concert. Thus, three works were commissioned for the concert using both instrumental groups (*Path*–Michelle Agnes Magalhães, *Theta Carinae*–Bertrand Gourdy[17] and *Country & Gamelan #5*–Thomas Meadowcroft), and a fourth piece chosen from the traditional Balinese repertoire for gamelan (*Sapta Murti* by I Wayan Dibia). The richness of the metallic sounds and the exploration of an entire acoustic universe as a series of non-tempered and microtonal effects was the focus of this concert. The gathering of the instruments created numerous and interesting acoustic effects, proving to be the main characteristic of the sound research for this concert (Fig. 8.15). Some of these results were noticed (such as the beating effect resulting from very close and non-complementary frequencies) and others, even if influencing the final spectral phenomena, were not (such as phase cancellation). This specific aspect provided new elements to describe the SIX-XEN and to understand the instrument inside a broader Xenakian perspective[18].

[17] *Theta Carinae* was presented this time in its new and final version.
[18] See Chapter 3.


***Figure 8.15***. Preparation (**a** and **b**) and performance (**c** and **d**) during Concert 2. Source of **a** and **b**: Photo by the author. Source of **c** and **d**: Sarah Brabo-Durand.

The meeting of traditional and new instruments gave rise to original materials for composition and new challenges for performers. To address the clash of tradition and avant-garde music, three composers were invited to write new pieces. The repertoire contrasted acoustic pieces–*Sapta Murti*, *Path* and *Theta Carinae*–and a piece with electronics–*Country & Gamelan #5*. The Sixxen was used in its entirety in *Country & Gamelan #5* and *Theta Carinae*. However, in *Path* only 4 sixxens were used. *Sapta Murti*, as a traditional piece of the Balinese *gamelan gong kebyar* repertoire does not include Sixxen, and its use in the program exemplified the kind of gamelan sound that clearly influenced Xenakis during and after his trip to Indonesia. The inclusion of this piece refined my skills necessary to play a *kotekan* and to perceive the differences between *polos* and *sangsi* as a foundation of the compositional process in Indonesian traditions. It would be impossible to see the presence of similar structures in *Pléïades* without an immersive context and demanding practice. The Indonesian piece also represented one of the multiple gamelan styles that the composer experienced in the trip, the gong kebyar style.

All the elements mentioned above have evident links with the research (as addressed in Chapters 1, 6 and 7), mainly by reflecting on the creative process that is established when a composer seeks to include non-European traditions in his approach. With this concert, the fact that I collaborated with Gourdy, Magalhães and Meadowcroft, and because they were motivated by different aspects of the SIX-XEN's and the gamelan's sonic phenomena, an opening into the creative process of Xenakis was possible. It was as if I had found an access key and I was vicariously exchanging with Xenakis to understand his motivations, by the countless possibilities experienced with these three composers.

They were much more than vectors of communication with Xenakis' creative process and they tremendously helped me artistically speaking. However, their ways to use, experiment, and question different possibilities, redefined my own perspectives about those processes in Xenakis' reality and context. The entirety allowed me to see how interests can turn to melodic structures, aspects of timbre and instrumentation, rhythmic constructions or even broader elements of form and large sections. The approaches of the composers during this stage, being dissimilar, pointed to the understanding of Xenakis' potential tools and interests dealing with similar materials. Once more, with these experiences in hand, I had also a better panorama to work on the analysis of *Pléïades*[19].

#### 8.2.1.3 *Ein pentachromatischer Blick*

The main goals of the third concert–intitled *Ein pentachromatischer Blick* ("A pentachromatic view", Fig. 8.16)–were to deepen the understanding on how composers interact with a Sixxen, and how the instrument can be adapted depending on specific artistic perspectives. This time, complete freedom was an important part of the observation and no imposition of instrumentation, correlation with gamelan or other decisions occurred. In my personal process, it was also an opportunity to be confronted artistically with new approaches to the instrument and to interact with new points of view about the Xenakian musical object. The repertoire thus contrasted acoustic pieces (*Σχίζειν–Schizein* by Daphné Hejebri, *Slow, Text, Fast* by Zacarias Maia, and *theôrìa α* by Charles David Wajnberg) and pieces with electronic devices (*Um* by Gitbi Kwon and *Seven* by Anna Sowa). In *Um*, Kwon used sound transducers to stimulate acoustic instruments that complemented the Sixxen timbres. In *Seven*, written exclusively for Sixxen, Sowa used a tape made of pre-recorded electroacoustic sounds. This concert featured five new pieces, which were five original creations for Sixxen by composers from different origins (Brazil, France, Poland, and South Korea).


***Figure 8.16***. Access to the additional documents and recordings of Concert 3: *Ein pentachromatischer Blick.* Link: *www.ronangil.com/doctorate-concert-3*

[19] Better addressed in Chapters 5 and 6.

The Sixxen was used in its entirety in *Σχίζειν–Schizein*, *Seven*, *Um*, and *theôrìa α*. In *Slow, Text, Fast*, Maia used only isolated sounds of the instrument in just four bars. The aspect of spatial arrangement of the instruments was a key element for all composers (Fig. 8.17), and they occupied the entire concert hall. Four pieces placed musicians around the audience, creating an hexaphonic effect (Fig. 8.17c and d) that immersed the listeners into the sounds (*Σχίζειν–Schizein*, *Seven*, *Um*, and *theôrìa α*). On the other hand, Maia proposed in the constant displacement of the performers in *Slow, Text, Fast*. Here as well, the listeners were immersed in a universe of sounds, but with the source of sounds moving throughout the concert hall.


***Figure 8.17***. Preparation (**a** and **b**) and work with the composers (**c** and **d**) to Concert 3. Source of all: Sarah Brabo-Durand.

This concert is connected to the in-depth review here achieved (Chapter 11–Subchapter 11.1), being part of my personal acting on the commission of new pieces. In this way, the premiered pieces are important additions to the repertoire for the SIX-XEN and they made important contributions to the discussion about its notation and the diversity of compositional approaches. As demonstrated there, the present artistic work can be placed in a very special position because of the contributions to a new literature for the SIX-XEN[20].

#### 8.2.1.4 *Iannis Xenakis. Viele Schlagzeugklänge zu seinem hundertsten Geburtstag*

This concert was part of the official commemoration of Xenakis' centenary (see more details in *www.iannis-xenakis.org/en/centenaire/* and *www.iannis-xenakis.org/en/tribute-to-xenakis-concert-*

[20] A further discussion regarding the specific contributions of these composers will be better addressed in Chapter 11.

*in-bale-12th-april/*) and was based on three important aspects of the composer's production: chronology, timbre, and space. The selected repertoire thus represented four decades of Xenakis' life and focused on the central role that percussion music played in his career (Fig. 8.18). Through the presence of both his first and last piece for percussion ensemble, respectively *Persephassa* (1969) and *Zythos* (1996), his main compositional approaches in regards to percussion instruments were highlighted. The selection also summarized his most important and personal techniques, derived essentially from theoretical aspects such as stochastic distribution and stochastic flow, random walk, sound halo, arborescence, sieve theory and others. In this view, the concert was a sort of practical exposition of his main compositional processes, briefly applied to percussion literature and through a chronological lens. The pieces thus methodically represented the 1960s (*Persephassa*), 1970s (*Pléïades*), 1980s (*Okho*), and 1990s (*Zythos*), successively highlighting what researchers generally classify as the four main phases in his work.


***Figure 8.18***. Access to the additional documents and recordings of Concert 4: *Iannis Xenakis*. Link: *www.ronangil.com/doctorate-concert-4*

The space as a musical element was always fundamental in Xenakis' work. Therefore, a special attention was to the position of the audience within the instrumental disposition (Fig. 8.19). The pieces encouraged listeners to feel and perceive themselves as part of Xenakis' sea of sound by immersing themselves in the musical flow (as the composer himself stated in several interviews). This specific way to organize the stage and the different possibilities with which the composer addressed the issue gave a better cohesion to discuss this subject (above elaborated in Section 8.1.2). In this perspective, the historic research also helped to understand the possibilities that Xenakis used to dispose *Pléïades*' instrumentation in different spectacles. The many documents found show that some different dispositions were experimented with by the composer, and this was the opportunity to attempt the same that he had tried but never suggested in the introduction of the piece. A study on the evolution

of Xenakis' notation to the percussive instruments was also necessary. At this moment, I put the percussive sound treatments made by the composer in context, as well as the use of the parameter of space in his percussion pieces, being later the main approaches that I addressed in the analysis of *Pléïades*.

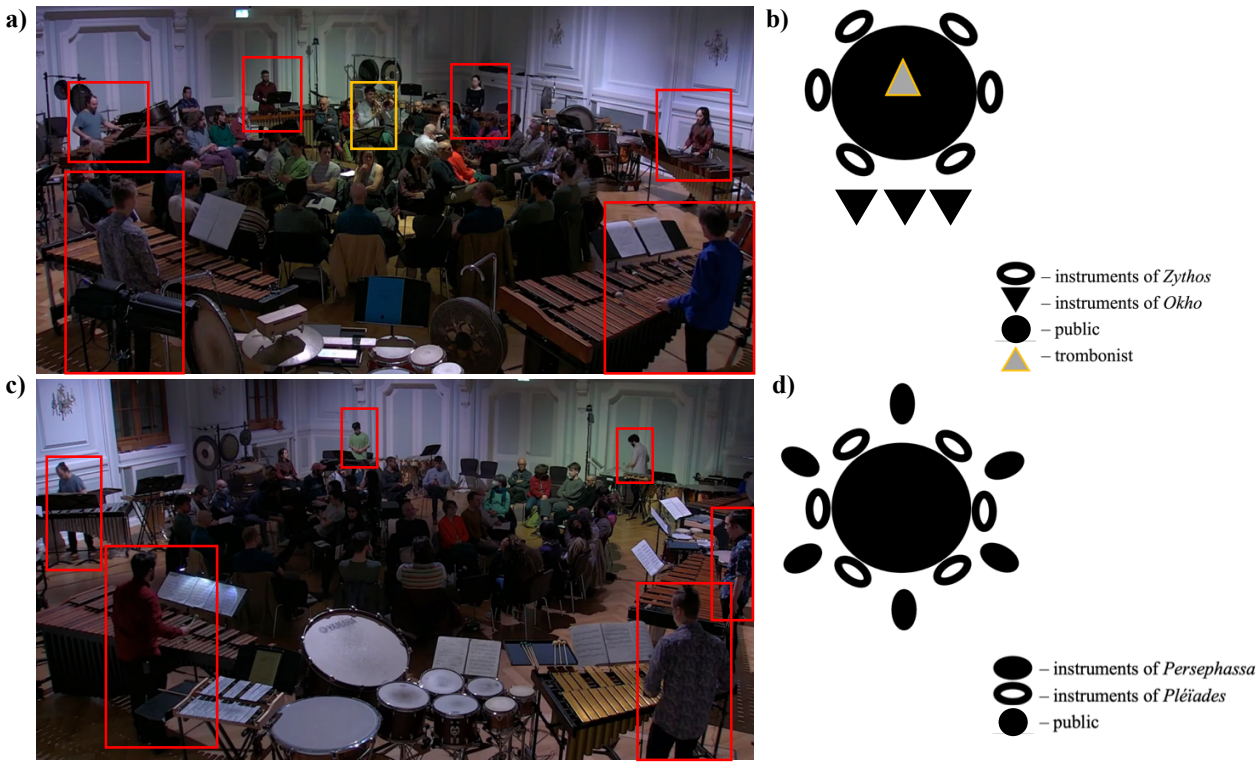



***Figure 8.19***. Disposition of the audience and performance during Concert 4. **a)** Performance of *Zythos* (1996) with the percussionists surrounding the public (in red) and the trombonist surrounded by the audience (in yellow). **b)** Schematic representation of the disposition of *Zythos* and *Okho*. **c)** Performance of *Pléïades* (1978) with the percussionists surrounding the audience. **d)** Schematic representation of the disposition of *Pléïades* and *Persephassa*.

The concert spotlighted some artistic choices based on reflections and theoretical considerations brought by the historical and analytical perspectives of the research[21]. Because this was the last concert and a great part of the research was in the advanced stage, this concert was more influenced by the data collected with other approaches than the previous two. As a result, this concert referenced the historical aspects of the diverse applications of the SIX-XEN by Xenakis in varied contexts and the different dispositions of musicians that he adopted when organizing the performance of *Pléïades*. There was an importance on the analytical elements as support for the performance, and the hearing of the materials and structures that were previously pointed by the analysis was reinforcing its consistency. The concert in general also represented an homage to the percussion ensembles that worked with Xenakis[22]. *Persephassa*, *Pléïades* and *Idmen A B* were dedicated and premiered by Les Percussions de Strasbourg, *Okho* by Trio Le Cercle and *Zythos* by Kroumata with trombonist

[21] As mainly presented in Chapters 4, 5, 6, and 7.
[22] As mainly addressed in Chapter 9.

Christian Lindberg. Les Pléiades, ensemble directed by Sylvio Gualda, were crucial in this process, as they also exchanged with the composer to construct different prototypes. Members of the four ensembles were part of the present research because they agreed to contribute with their experiences. Thus, this sincere homage to Xenakis was also dedicated to the percussionists that developed his initial ideas and to the overall percussive community.

### 8.2.2 The repertoire developed during the research

We had previously worked with new commissions for Sixxen during the project to construct the first Brazilian Sixxen. This repertoire was developed in 2016 and 2017 with four pieces composed, including the first concerto for Sixxen and orchestra by Michelle Agnes Magalhães (*After Spring*, 2016). Eight pieces were commissioned and created during the development of the present research (Zacarias Maia, however, would ultimately compose another piece during the process that has not yet been premiered). While our first experience commissioning pieces and working with composers had a clear objective of incentivizing a Brazilian repertoire for Sixxen, the objectives during my studies were broader and more related to the development of possible correlations with gamelan instruments. Thus, nine new pieces were related to the present research, all being original contributions made by Gourdy, Hejebri, Kwon, Magalhães, Maia, Meadowcroft, Sowa and Wajnberg (Table 8-3).

***Table 8-3***. List of pieces commissioned during the research.

| Composer (Country) | *Title* | Year | Instrumentation (number of musicians) |
|---|---|---|---|
| Bertrand Gourdy (FRA) | *Theta Carinae*<br>– 1st version<br>– final version | <br>2019<br>2021 | Sixxen and gamelan instruments (sextet) |
| Daphné Hejebri (FRA) | *Σχίζειν – Schizein* | 2021 | Sixxen (sextet) |
| Gitbi Kwon (KOR) | *Um* | 2021 | Sixxen, multipercussion and transducers (sextet) |
| Michelle Agnes Magalhães (BRA) | *Path* | 2021 | 4 sixxens and gamelan instruments (sextet) |
| Zacarias Maia (BRA) | *Slow, Text, Fast* | 2021 | 4 bars of a Sixxen and music theater (quartet) |
| | *One direction* | 2021 | 4 bars of a Sixxen and music theater (quartet) |
| Thomas Meadowcroft (AUS) | *Country & Gamelan #5* | 2021 | Sixxen, gamelan instruments, multipercussion, ukulele and tape (nonet) |
| Anna Sowa (POL) | *Seven* | 2021 | Sixxen with tape (sextet) |
| Charles David Wajnberg (FRA) | *theôrìa α* | 2021 | Sixxen and multipercussion (sextet) |

**Legend:** AUS – Australia; BRA – Brazil; FRA – France; KOR – South Korea; POL – Poland

The discussion about notation and other specific elements will occur in Chapter 11– Subchapter 11.2, constituting a broader analysis of the repertoire available for the SIX-XEN. However, it is important to point out that the commissions tied to this research represent a variety of artistic processes. They are mostly acoustic pieces (*Theta Carinae*; *Σχίζειν–Schizein*; *Path*; *Slow, Text, Fast*; *One direction*; *theôrìa α*) but some of them also include live electronics (*Um*) or tape (*Country & Gamelan #5*; *Seven*).

The present research work is characterized by two approaches, a musicology approach and practice-based approach, both of which require further attention. The specific suggestions that characterize the musicological approach will be addressed in the Final considerations, whereas the new ideas and future perspectives derived from the practice-based research will be addressed below.

### 8.2.3 Future perspectives of an infinite journey

The work developed during this dissertation made me reconsider certain perspectives and their potential future developments, incentivizing me to conceptualize and present new projects. In terms of artistic achievements, I personally intend to continue developing a new repertoire for the SIX-XEN, continuously working with more composers from different aesthetics. The expansion of the repertoire is still of great importance and potentially leading to an increasing knowledge regarding the instrument created by Xenakis. I intend to pursue this course of action with the production of a concert in which the four movements of *Pléïades* would be interspersed with three new works by different composers. Each composer would be invited to work based on the instrumentation of a movement of *Pléïades*. Thus, one composer might compose for the same keyboards used in «*Claviers*», another for a Sixxen as in «*Métaux*», another for the same sets of drums used in «*Peaux*», and possibly concluding the concert with «*Mélanges*».

In terms of innovation in the construction of a Sixxen, I would like to build a new prototype based on certain ideas coming from the Indonesian influences of Xenakis. The bars would be designed to present correlations with the structural characteristics of a gamelan set. I also intend to present a version of «*Métaux*» in which the Sixxen is comprised of bars taken from gamelan instruments; still respecting the parameters defined by Xenakis to build its instrument, the focus is to search for potential sonorities with metallic materials coming from Indonesia. This experience of using other timbres and tuning modes could serve as a comparative acoustic analysis between both types of metallic instruments. In this way, I would also like to continue to develop my practice of gamelan techniques and its traditional repertoire.

In a convergence of these aims, I seek to continually develop a repertoire to create a dialogue between a Sixxen and gamelan. In this way, I foster more collaborations not only with composers but also for a full event, with a specific repertoire and video projection, creating its own atmosphere

between sounds, lights and image interaction that could offer an immersive experience to the audience.

It was through the conception and coordination of a project to construct a Sixxen that many questions first arose. Close to a decade of personal engagement in the subject has now concluded, but only partially, because new questions and artistic ideas have emerged with the present research work. My doctoral process in general, with the present dissertation and the artistic development made possible, is the accomplishment of a long journey that started in 2013, but that will certainly ramify and fructify in more directions in the coming years.

The next and last part will examine a broad perspective about the SIX-XEN and its repertoire, where the discussion will initially describe Sixxens that Xenakis helped to create and the percussion ensembles that invested on the project (Chapter 9). It will then compare the characteristics of diverse prototypes (Chapter 10) and address the broader repertoire found about the instrument heretofore, as well as the diverse notations applied by different composers (Chapter 11).

# Part IV – On instruments, pieces, and collectivity

# Chapter 9. Percussion ensembles and first Sixxens

*When I was younger, I discovered and fell in love with Asian and African instruments. But now new instruments with new timbres need to be developed. I hope that the percussionist will develop these new instruments*
*Iannis Xenakis* (Yoken, 1990, p. 53)

*Pléïades* (1978) composition stipulated musicians' engagement to construct an instrument that allows them to contribute to its fundamental timbre characteristics. With this piece, the composer fundamentally continues to challenge the interpreters to be active agents in the conception of his work, impelling them to develop new approaches to his music as well as their own perspectives in sound research. Those aspects were something consciously considered by Iannis Xenakis, as previously considered[1]. It is in light of the whole practical vision and the multiple performances approaches that the interpreters' contributions should be considered. Xenakis was then conscious that their active participation in the production of instruments could bring better objects, artistic approaches, and results. The exchanges between the experiences of construction and interpretation were positive for Xenakis, one feedbacking the other. In this double role of turning some ideas or concepts into a tangible object as a constructor and turning this interesting object into an artistic act as a performer, many challenges and improvements have appeared since the first prototype was constructed in 1979.

To understand Xenakis' interest in building a new acoustic instrument, it is also necessary to address his interest in percussion, as well as his contacts and ties with percussionists. In this context, the entire percussive community that exchanged with him and participated in a cooperative environment in which different prototypes and models were created was also responsible for the practical development of his then-new concept and the achievement of part of his work. This chapter will thus focus on the relationship between Xenakis and the different percussion ensembles that created one Sixxen or more in the late 1970s and 1980s, also addressing the exchanges that occurred in the same period between Xenakis and various companies and instrument builders. It is important to look at the exchanges between the composer and the interpreters that were close to him and tried to respect his indications achieving a convincing model to highlight Xenakis' opinions about different prototypes. While the earlier Sixxens will be better described, the prototypes created at the beginning of the 1990s will be addressed more broadly.

[1] Xenakis stated in a 1986 interview with Yoken: "The percussionist must engage his entire body in the aspects of sound production. The percussionist must be involved in the invention and manufacturing of new instruments. With artistic integrity, the percussionist should work closely with industry to create these new instruments. Unfortunately, today commercial instrument manufacturers are not interested in this development." (Yoken, 1990, pp. 54-55). Even if this interview was focused on *Psappha*, Xenakis stated that the interpreter, if implicated in the construction of the instrument, would have many elements to contribute to because of the experiences the practice could bring. See Chapter 3–Section 3.1.4 for more details.

According to many percussionists and specialists on Xenakis, *Pléïades* remained exclusively in the repertoire of Les Percussions de Strasbourg until at least the end of the 1980s. This section will show that, in reality, starting in 1980, many groups followed the original sextet and played the piece in different countries. For the first time, a clear historical panorama of the first groups to construct Sixxen prototypes will be exposed, demonstrating a profusion of musicians who were motivated to play the piece, make contact with the composer, and learn from him details about his then-new instrument.

## 9.1 Les Percussions de Strasbourg (France, 1979)

This professional group was founded in 1961 with the meeting of the three percussionists of the *Orchestre de Radio Strasbourg* (with Charles Brück as conductor) and the three percussionists of the *Orchestre Municipal de Strasbourg* (with Ernest Bour as conductor). On January 17, 1962, the G.I.P.S. (*Groupe Instrumental à Percussion de Strasbourg*)—consisting of Bernard Balet, Claude Ricou, Georges van Gucht, Jean Batigne, Jean-Paul Finkbeiner, and Lucien Droeller—gave its first concert with works by Béla Bartók, Serge Nigg, and Edgard Varèse. With all subsequent changes in terms of members and workplaces, the ensemble spans over 60 years, including commissions of more than 400 works specific to its sextet formation and collaborations with numerous composers, such as André Boucourechliev, Betsy Jolas, Doina Rotaru, François-Bernard Mâche, Georges Aperghis, Gérard Grisey, Hugues Dufourt, John Cage, Karlheinz Stockhausen, Martin Matalon, Olivier Messiaen, Philippe Manoury, Philippe Hurel, and Sofia Gubaidulina, to mention just a few.

The group premiered almost all of Xenakis' percussion sextets (*Persephassa*, *Pléïades,* and *Idmen A B*) and participated in the broader spectrum of the composer's works, such as *Taurhiphanie*, among others. They exchanged countless moments with the composer, recorded his pieces several times, and worked hard to diffuse his repertoire. Batigne (1981) even stated that the original group's initial intentions were fully accomplished with the pieces by Xenakis[2]. For this percussionist, these were such important works that they justified the meaning and reason for the ensemble's existence. For *Pléïades*, they also dedicated much of their time creating the SIX-XEN and thus stimulated the construction of different prototypes.

The musicians who premiered *Pléïades* in 1979 were Claude Ricou, Gabriel Bouchet, Georges van Gucht, Jean Batigne, Jean-Paul Finkbeiner, and Olivier Dejours. Excluding Bouchet (that quickly entered the group and could be considered part of its first generation of stable musicians) and Dejours, all were part of the first concert of the ensemble. Jean Batigne and Olivier Dejours left the group in

[2] "Today these two works [*Persephassa*, and *Pléïades*] fulfill to the fullest what we hoped for when we formed our ensemble in 1962." As originally stated: "Aujourd'hui ces deux œuvres comblent à souhait ce que nous espérions lorsque nous avons formé notre ensemble en 1962." (Batigne, 1981, p. 179).

the following years after the creation of *Pléïades* and were replaced by Christian Hamouy and Keiko Nakamura for the performances of *Le Concile Musical* (in 1983 and 1984), as well as the subsequent new repertoire after 1983.

The ensemble developed five prototypes based essentially on three types of bar profiles. They exchanged numerous times with the composer and various companies to improve the SIX-XEN. Among the prototypes, they tried to stimulate the construction of a different industrialized model by Yamaha (which did not end up being finalized as a concrete model) and created another more recent prototype in a project with designers and engineers, which was started in 2018 and accomplished in 2021.

### 9.1.1 First Sixxen made by Kolberg and its variant (1979)

In Chapter 2, it was pointed out that the period of time available to develop the new instrument before the premiere of *Pléïades* as part of the spectacle *Le Concile Musical* was extremely short. Only four months separated the score's completion (December 27, 1978) and the first rehearsals with the *Ballet du Rhin* in Mulhouse (April 20, 1979). It was a problematic constraint because, aside from the decisions and needs associated with development and testing of the prototype (searching for appropriate metals, tuning the bars, and frame construction), the percussionists had to send a recording to the choreographer as soon as possible. In this short window of time, many problems had to be solved through exchanges between Xenakis, Les Percussions de Strasbourg, and the instrument developer. In a letter from Jean Batigne to the composer on September 9, 1978, the artistic director of the Les Percussions de Strasbourg stated:

> As you mentioned to Claude Ricou in Aix, apart from the period from September 20 to 25 (included), you can come and see our instruments whenever you like, but I think quite quickly if possible, because time is running out and we would like to devote our working time to your new work during December 1978[3] (Jean Batigne, mail to Iannis Xenakis, September 9, 1978).

It is not clear if Xenakis went to Strasbourg or the percussionists to Paris, or even if this meeting occurred in September at all, but just after this mail, the composer started to work on the first sketch of *Pléïades* that presents the name of the movements, and the initial concepts on his instrument (OM 28-17 p. 15 of the *Collection Famille Iannis Xenakis* is from September 28, see more details in Chapter 3–Section 3.1.1). This document has a detailed list of instruments that the percussionists had available, suggesting that, if the meeting did not occur, the material they had was precisely sent to Xenakis.

In his memoirs, Georges van Gucht (interview by author, 2020) stated that the group started to

[3] "Comme tu en a parlé à Claude Ricou à Aix, hormis la période du 20 au 25 septembre inclus, tu peux venir visiter nos instruments quand bon te semblera, mais je pense si possible assez vite car le temps passe et nous aimerions consacrer à ta nouvelle œuvre notre temps de travail courant décembre 1978" (Jean Batigne, mail to Iannis Xenakis, September 9, 1978).

develop the first prototype of Sixxen only in 1979[4]. The group members recounted, "After many tests, Les Percussions de Strasbourg and Xenakis went to a German manufacturer, Mr. KOLBERG, who presented different alloys and built the first instrument"[5] (Les Percussions de Strasbourg, 1991, p. 2). The first model created for them in 1979 was then realized by Kolberg (Fig. 9.1a), a company located near Stuttgart (Germany).

**a)**  **b)** 

***Figure 9.1***. The first two prototypes of Sixxen developed. **a)** First prototype (Gabriel Bouchet). **b)** Second prototype (Jean-Paul Finkbeiner on left and Gabriel Bouchet on the right). Source of both: Gabriel Bouchet's archives.

Xenakis was present on different occasions to choose the type of metal and the sound of the bars, as stated by van Gucht (interview by author, 2020):

> It's a very unique instrument, and it's obvious that before having the perfect realization of the instrument, there were several tests before creating it. First of all, we had to find the metal, we went to Germany to see an instrument builder [and it was] Kolberg, yes. Then we had to install it, so we installed it like a set of bells, but with the speed of the executions, it was difficult not to clash the bars. So, the realization on a vertical plane was not possible. So afterwards, it was necessary to put the elements on a horizontal plane, and all that was a problem of research of sonorities because Xenakis had his idea, and every time we made rehearsals, he listened. He listened and noted in his head everything that he could improve.[6]

Claude Walter[7] (interview by author, 2021) also complemented that:

> I remember that [meeting in Germany at Kolberg company.] Yes, absolutely. They had tried different materials, and they had retained these brass flat bars, so Kolberg cut them out, and

[4] "I know that Iannis wrote [Pleiades] between '78-79, so it was probably in '79." As originally stated: "Je sais que Iannis a écrit [*Pléïades*] entre 78-79, donc c'était sûrement en 79." (van Gucht, interview by author, 2020).

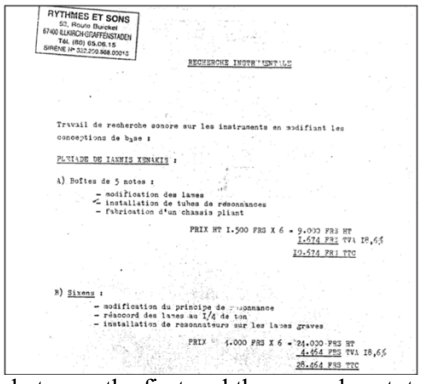
[5] "Après de nombreux essais, les Percussions de Strasbourg et I. Xenakis s'étaient rendus auprès d'un constructeur allemand, Monsieur KOLBERG, qui présenta différents alliages et construisit le premier instrument" (Les Percussions de Strasbourg, 1991, p. 2).

[6] "C'est un instrument tout à fait unique et il est évident qu'avant d'avoir la réalisation parfaite de l'instrument, il y a eu plusieurs épreuves, avant de le créer. D'abord il a fallu trouver le métal, on est allés voir en Allemagne chez un constructeur d'instruments [et c'était] Kolberg, oui. Ensuite il a fallu l'installer, donc on l'a installé comme des jeux de cloches, mais avec la rapidité des exécutions c'était difficile de ne pas entrechoquer les lames. Donc la réalisation sur un plan vertical n'était pas possible. Donc après, il a fallu mettre les éléments sur une partie horizontale et tout ça a été un problème de recherche de sonorités, parce que Xenakis avait son idée, et à chaque fois qu'on faisait des répétitions il écoutait. Il écoutait et il notait dans sa tête tout ce qu'il pouvait améliorer." (van Gucht, interview by author, 2020).

[7] Claude Walter was stage manager at Les Percussion de Strasbourg from 1978 until 1983, when he founded *Rythmes et Sons*, his own company of material for orchestra and instruments (renting and purchasing) in 1981. The company's sale of musical instruments and production of flight cases are the results of its founder's work with the percussions sextet. More specifically, *Rythmes et Sons*, one of the most important orchestral equipment companies in Europe, is a consequence of Xenakis and the development of his instrument as Walter himself expressed.

> I think that originally it was suspended. So, it was very hard for them to play, because I think it was swinging, it was moving, and as the piece is quite complicated to play it was not easy. [...] So, I was in contact with Xenakis at that time, because he came regularly to Strasbourg for this creation, and it seems to me that we were even at Kolberg company together, and he worked with all our instruments, the complete instrumentarium. Because when I arrived at the Les Percussions de Strasbourg, they had instruments for the concerts, so it was loaded each time to rehearse. And the idea of the group [...] was to double the instrumentarium, to avoid unpacking all the toms, to repack them... as they were a little old they said, "we will double the instrumentarium." What was extraordinary was that when Xenakis arrived he saw all this, and he wrote for everything. He wrote for both sets of instruments.[8]

The bars of the first Sixxen were thus made out of brass and were vertically arranged in two rows of suspended plates (Fig. 9.1a). They were arranged in the disposition of one octave and a half of a keyboard from F to B (which would characterize all subsequent prototypes used by Les Percussions de Strasbourg). Then, the group modified this Kolberg model for the premiere of the instrumental version in 1979. The same metal bars used in the first prototype were placed in a different structure that was able to support them in a horizontal position (Fig. 9.1b), as the percussionists had decided to readjust them for ergonomic and technical reasons. This modification partially altered the sound of the bars in terms of their resonance and the partials emitted. According to Les Percussions de Strasbourg (1991, p. 2), "The transformation was done by Claude WALTER, then assistant of the Percussions de Strasbourg, today director of *Rythmes et Sons*."[9] In a 1979 invoice (Fig. 9.2), it can be seen that it was not only the arrangement of the bars that was altered; in addition, resonators were installed for the lower notes, and the metallic material underwent a retuning (the term used was "1/4 tone re-tuning of the bars"). These changes from the original prototype were, therefore, significant.


RYTHMES ET SONS
67400 ILLKIRCH-GRAFFENSTADEN

Travail de recherche sonore sur les instruments en modifiant les conceptions de base :

PLYTHAZE DE IANNIS XENAKIS :

A) Boîtes de 5 notes :
- modification des lames
- installation de tubes de résonnances
- fabrication d'un chassis pliant

PRIX HT 1.500 FRS X 6 = 9.000 FRS HT
1.674 FRS TVA 18,6%
10.674 FRS TTC

B) Sixxen :
- modification du principe de résonnance
- réaccord des lames au 1/4 de ton
- installation de resonnateurs sur les lames graves

PRIX HT 4.000 FRS X 6 = 24.000 FRS HT
4.464 FRS TVA 18,6%
28.464 FRS TTC

***Figure 9.2.*** 1979 invoice of the changes between the first and the second prototype of Sixxen. Source: © LPSA.

[8] "Oui, même moi je me souviens de ça[, de cette rencontre en Allemagne chez Kolberg.] Oui, tout à fait. Ils avaient essayé différents matériaux et ils avaient retenu effectivement ces lames en laiton ; du coup Kolberg les a débitées et je crois qu'à l'origine c'était accroché sur un portique. Du coup, c'était très dur pour eux de les jouer, parce que je crois que ça balançait, ça bougeait, et comme la pièce est quand même assez compliquée à jouer, ce n'était pas simple quoi. [...] Alors moi j'ai côtoyé Xenakis à cette époque-là, parce qu'il venait régulièrement à Strasbourg pour cette création, et il me semble même qu'on était chez Kolberg ensemble, et il travaillait sur l'instrumentarium complet. Parce que moi, quand je suis arrivé aux percussions de Strasbourg, ils avaient un instrumentarium pour les concerts et donc il était chargé à chaque fois pour répéter. Et l'idée des percussions de Strasbourg – c'était à peu près quand je suis rentré dans le groupe, en 1978 je crois – c'était de doubler l'instrumentarium, pour éviter de déballer tous les toms, de les remballer… comme ils étaient un peu anciens, ils ont dit « on va doubler l'instrumentarium ». Ce qui était extraordinaire, c'est que quand Xenakis est arrivé il a vu tout ça, et il a écrit pour tout. Il a écrit pour les deux instrumentarium." (Claude Walter, interview by author, 2021).

[9] "La transformation fut exécutée par Claude WALTER, alors régisseur des Percussions de Strasbourg, aujourd'hui directeur de Rythmes et Sons." (Les Percussions de Strasbourg, 1991, p. 2).

The sounds of this second prototype were recorded by the *Südwestrundfunk* (SWR) Baden-Baden in two concerts, representing the German premiere of *Pléïades* (December 1 and 2, 1979). Xenakis used this recording to show other groups the sonority of the Sixxen that had already been produced, but that should be improved. With the renewal of the Kolberg prototype, *Rythmes et Sons* also developed the five-note boxes on which the group plays the final section of «*Claviers*» (meas. 111 to 131) and their recapitulations in «*Mélanges*». These boxes, which were created to allow much faster passages of notes, have been used heretofore (Fig. 9.3).

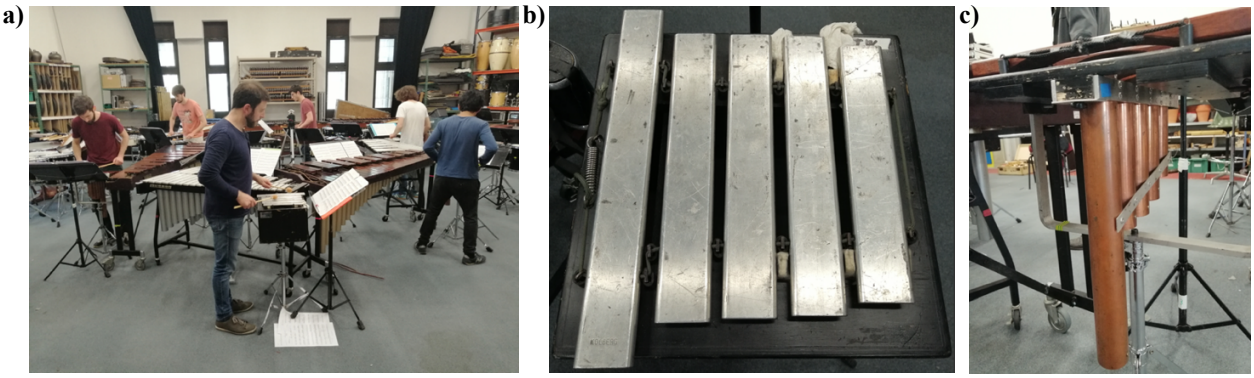



***Figure 9.3.*** Boxes with specific notes used during the final section in «*Claviers*» (meas. 111 to 131) and the recapitulation in «*Mélanges*». **a)** Les percussions de Strasbourg rehearsing the excerpt in 2019. **b)** Metallic bars to substitute the vibraphone. **c)** Detail of the resonators of the wooden bars. Source of all: Photo by the author.

When asked who had the idea for these boxes, Keiko Nakamura specifically stated:

> We proposed [the idea]. First, it came because of the tempo. At the time of the creation, I was there, everyone could not arrive at the tempo, it was difficult, really difficult. [...] who proposed to make a box, thus by gathering the six boxes, it was Batigne who proposed. However, there are currently many people who play this part with three mallets, four mallets in hand, but that he did not agree at all Iannis. It has to be two mallets from A to Z. That also comes from the sound he was looking for. He was very precise on his thing.[10] (Nakamura, interview by author, 2020).

They used the second version of the Kolberg Sixxen on numerous occasions until 1985 when the group searched for the construction of a new prototype. With this new instrument available (that will be soon described as the Hébrard-Abitbol model), they started to rent out the previous one, as declared by different musicians during the present research. Unfortunately, the Kolberg prototypes, or at least the flat bars of brass developed by the German company, are no more part of Les Percussions de Strasbourg's instrumentarium. As described by François Papirer (interview by author, 2019), musicians of the group from 1996, the Sixxen bars of the first Kolberg prototype were lost

[10] "c'est nous qui avons proposé [l'idée]. D'abord c'est venu à cause du tempo. Au moment de la création, j'étais là, tout le monde ne pouvait pas arriver au tempo, c'était difficile, vraiment difficile. Et il n'y a pas que ça, en proposant de faire une boite, donc en rassemblant les six boites, c'est Batigne qui a proposé, mais actuellement il y a beaucoup de gens qui jouent cette partie-là avec trois baguettes, quatre baguettes en main, ça il n'était pas d'accord du tout Iannis. Il faut que ça soit deux baguettes de A à Z. Ça aussi ça vient du son qu'il cherchait. Lui il était très très précis sur son truc." (Nakamura, interview by author, 2020).

"because it was stolen from us, not to make music but because the metal was interesting."[11] As he better described:

> In fact, the group had a warehouse in Ostwald[12] , which was lent by the city of Strasbourg. For us, it was a storage space, so there were old decors, like what they called "le Miron," this bird which was used in *Musik im Bauch* of Stockhausen... and other things stored there, so at the end, on a certain moment to make place here it was necessary to put the sixxens there, since we weren't playing them anymore, since we were playing on the Sixxen 3 [created by Robert Hébrard]. And the day when the city told us, this is maybe in the late 1990s, early 2000s, they told us, "listen, this warehouse has to be emptied." I think we didn't take care of it, and then we learn that the warehouse was visited and that the flat bars were taken, removed from their frames, so we only had the carcass which we got rid of.[13] (Papirer, interview by author, 2019).

Although this instrument disappeared, a vital part of the development and diffusion of the piece was possible with its sonorities. The fact that it is, unfortunately, no longer possible to use it or at least to hear it in person does not overshadow the innovativeness that it represents. The original sound of this Sixxen was eternalized in the recording made by the group in Baden-Baden. This recording, which can be found in the *Bibliothèque nationale de France* (DONAUD 0604 527–Xenakis 550), represents a window to the initial accomplishments at the construction of Xenakis' first complete acoustic instrument[14].

It seems that, even if this was a challenging accomplishment (due to the lack of time and amount of work to finish it until the premiere of *Le Concile Musical*) that tried to respect Xenakis' premises, the composer was not very convinced by its characteristics at the end. As stated by Gabriel Bouchet:

> Xenakis was there, and he was not satisfied with the instrument [of Kolberg]. That is, we played it several times like that, and a year later, he told us that it didn't suit him and he wanted to find something else. So there, because until then, it was us who had guided him, with Kolberg, all that, because we knew Kolberg. And then he met Mr. Hébrard, who was in the Paris region and who made original metal instruments, he worked with metal. And there Xenakis found an alloy that suited him, and how shall I say, it is there that we made the sixxen that still exists. And there the instrument was like a vibraphone, you know? The tuning was the same as with the first bars, by quarter tone. What happened is that we never had any contact with Hébrard, because he delivered the finished instrument to us[15] (Bouchet,

[11] "Alors moi, sans avoir joué dessus, j'ai vu la version d'avant, celle que Kolberg avait construite, qui était un Sixxen beaucoup plus réduit en taille, qui était déjà rangé en 2 claviers (je crois, je ne suis même pas sûr de ça, j'ai un vague souvenir) mais qui a connu une fin tragique parce qu'en fait on nous l'a dérobé, pas pour faire de la musique mais parce que le métal intéressait." (Papirer, interview by author, 2019).

[12] City in the vicinity of Strasbourg (France).

[13] "Oui, le Sixxen 2, qui en fait était dans la salle de répétition... En fait, le groupe avait un entrepôt à Ostwald qui était prêté par la ville de Strasbourg. Pour nous c'était un espace de stockage, donc il y avait des anciens décors, comme ce qu'ils appelaient le Musik im Bauch de Stockhausen cet oiseau qui servait… et d'autres choses stockées là-bas, donc au bout d'un moment pour faire de la place ici il a fallu mettre les sixxen là-bas, puisqu'on les jouait plus, puisqu'on jouait sur la version 3. Et le jour où la ville nous a dit, ça c'est peut-être dans les années fin 90, début 2000, ils nous ont dit « écoutez, cet entrepôt il faut le vider » ; je crois qu'on ne s'en est pas occupé, et du coup on apprend que l'entrepôt a été visité et que les lames ont été prises, enlevées de leur châssis, donc on avait plus que la carcasse dont on s'est débarrassé." (Papirer, interview by author, 2019).

[14] This recording attests to the first experiment to be developed in collaboration with Xenakis, and it could be specifically treated in future discussions about acoustic analyses of various Sixxens.

[15] "Xenakis était là, et il n'était pas satisfait de l'instrument [de Kolberg]. C'est-à-dire que on l'a joué plusieurs fois comme ça, et un an après il nous a dit que ça ne lui convenait pas et il voulait trouver autre chose. Alors là, parce que jusque-là c'est nous qui l'avions guidé, avec Kolberg, tout ça, parce qu'on connaissait Kolberg. Et alors là il a rencontré M. Hébrard, qui était dans la région parisienne et qui fabriquait des instruments inédits métalliques, il travaillait le métal.

interview by author, 2020).

The musicians of Les Percussions de Strasbourg present the same terms in another document stating, “This piece was played over and over again, very often in the presence of the composer who, through the different acoustics of the concert halls, thought that this instrument did not yet give satisfaction”[16] (Les Percussions de Strasbourg, 1991, p. 2). This instrument represents Xenakis’ first attempt to bring about his instrument, but his long journey to achieve a Sixxen was only beginning because of his dissatisfaction. The most representative sound of the Sixxen made by Les Percussions de Strasbourg would be yet created by Robert Hébrard and Albert Abitbol.

### 9.1.2 Hébrard-Abitbol model (1985)

The percussion ensemble commissioned the development of a new Sixxen with Robert Hébrard, the owner of the company Grimus (from the French *Groupe de recherche sur l’instrumentation musicale*–research group on musical instrumentation). The composer was dissatisfied with the Kolberg Sixxen and indicated this contact to the percussionists, being the new project financed by the Ministry of Culture. As van Gucht described:

> [...] we found a French builder, Hébrard, Grimus who was French, and who decided with the finances of the Ministry to build an instrument that corresponded to the taste of Iannis, with a system of pedals because there are sounds that resonate, others that had to be muffled, so with the pedal we could achieve everything he wanted to hear. It was the realization of this instrument that was really extraordinary[17] (van Gucht, interview by author, 2020).

Even if generally the central discourses of the percussionists, of Xenakis himself, and the media at the time only described Hébrard as responsible, Albert Abitbol was also working on the project, as visible in Fig. 9.4. Abitbol was a great connoisseur of metals and was responsible for the metal constructions and metallic products Grimus needed then.

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Et là Xénakis a trouvé un alliage qui lui convenait, et comment dirais-je, c’est là qu’on a réalisé les sixxen qui existent toujours. Et là l’instrument était comme un vibra, vous voyez ? L’accord était le même qu’avec les premières lames, par quart de ton. Ce qui s’est passé c’est que nous on n’a jamais eu de contact avec Hébrard, parce qu’il nous a livré l’instrument fini” (Bouchet, interview by author, 2020).

[16] “Cette pièce fut jouée maintes et maintes fois, très souvent en présence de l’auteur qui, au travers des différentes acoustiques des salles de concert, pensa que cet instrument ne donnait pas encore satisfaction” (Les Percussions de Strasbourg, 1991, p. 2).

[17] “on a trouvé un constructeur français, c’était donc Hébrard, Grimus qui était donc français, et qui a décidé avec les finances du Ministère de construire un instrument qui correspondait au gout de Iannis, avec un système de pédales puisqu’il y a des sons qui résonnent, d’autres qu’il fallait étouffer, donc avec la pédale on pouvait réaliser tout ce qu’il avait envie d’entendre. Ça a été la réalisation de cet instrument qui a été vraiment extraordinaire” (van Gucht, interview by author, 2020).


***Figure 9.4***. Manufacturers indicated in the frame of the third prototype of Les Percussions de Strasbourg: "Realization & conception R. Hébrard–A. Abitbol–Grimus." Source: Photo by the author.

The instrument was first presented to the public on September 29, 1985, during the *Festival Musica* 85 in a concert at the *Musée du Chemin de Fer* in Mulhouse (Fig. 9.5), which was coincidentally the same city that had hosted the premiere of *Le Concile Musical* in 1979. The musicians in this presentation were: Claude Ricou, Gabriel Bouchet, Georges van Gucht, Christian Hamouy, Jean-Pierre Bédoyan, and Keiko Nakamura.

**a)**  **b)** 

***Figure 9.5***. Creation of the Hébrard-Abitbol model of Sixxen in the *Musée du Chemin de Fer* at Mulhouse (France) in 1985. **a)** General view. **b)** Detail of the instrument. Source of both: © INA.

This concert was recorded and then sent to Xenakis. The composer was more pleased with the sounds of this prototype, as correspondence with Claude Ricou on December 16, 1985, attests:

> My Dear Claude,
> Mrs. Janine Chollet sent me a cassette of excerpts from "PLEIADES" that you played last September 29.
> I believe that the sounds of the SIX-XEN are improved. However, I wonder if it wouldn't be interesting to use harder sticks so that the sound is less soft, or is it a question of recording?
> On the other hand, the correct spelling of the SIX-XEN is the one you can read on this page.
> I think there is a misunderstanding that was stated on the radio and that you should correct in the program notes, i.e., "the SIX-XEN are designed by Iannis Xenakis, especially for the six percussionists of Strasbourg, and were built by Robert Hébrard."
> I embrace you all at once.[18] (Iannis Xenakis, mail to Claude Ricou, December 16, 1985).

[18] "Mon Cher Claude, Madame Janine Chollet m'a fait parvenir une cassette des extraits de 'PLEIADES' que vous avez joué le 29 Septembre dernier. Je crois que les sonorités de SIX-XEN sont améliorées. Je me demande toutefois s'il ne serait pas intéressant d'utiliser des baguettes plus dures pour que le son soit moins mou ou bien est-ce une question

When he listened to the recording, he was pleased with the acoustic and timbral improvements to the instrument, but on the other hand, he continued to emphasize that, for him, an element of extreme importance was the definition of the attacks. He also emphasized that it must always be announced that although he designed the instrument, it was Robert Hébrard who constructed it and developed the practical result. In giving credit to the constructor, Xenakis emphasized the importance of the difference between the author's concept (of the idea, the SIX-XEN) and the author's object (of the product, the Sixxen).

This instrument was used for the group's first recording on January 1986 in Colmar (France) and released by Harmonia Mundi. The composer was present at the recording sessions, and they conducted numerous acoustic and technical tests, as well as tests of the mallets, for this occasion (Fig. 9.6). The musicians in the first recording were Ricou, Bouchet, van Gucht, Hamouy, Bédoyan, and Nakamura.

**a)** **b)**

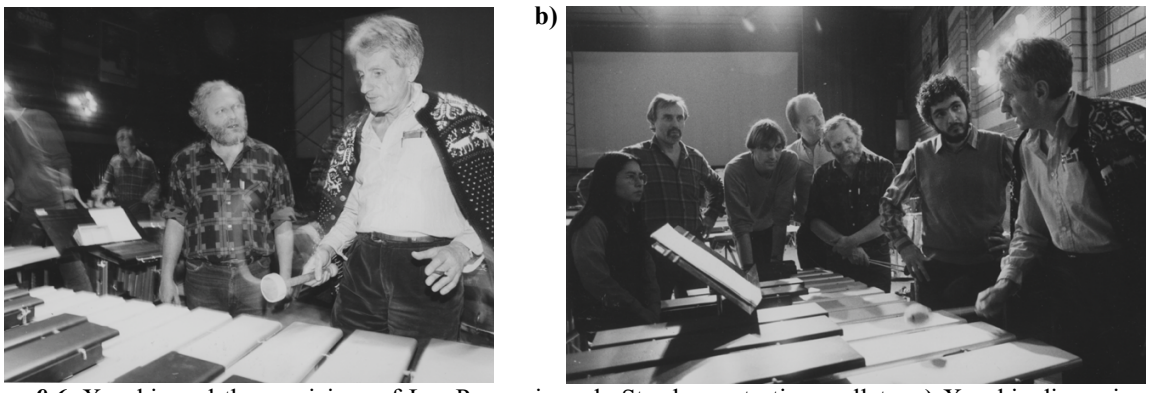

***Figure 9.6.*** Xenakis and the musicians of Les Percussions de Strasbourg testing mallets. **a)** Xenakis discussing with Georges van Gucht while playing a sixxen. Source: Photo by Jean-Louis Hess, Georges van Gucht's personal archives. **b)** Xenakis addresses a specific sound issue while playing a sixxen with a yarn mallet. Source: Photo by Jean-Louis Hess, Gabriel Bouchet's personal archives.

Keiko Nakamura described this specific experience of recording with Xenakis behind the sound table and closely paying attention to the microphones:

> Because we were five days, five days together. We were early in the morning, late in the evening, as usual. We only had five days, so... We took a lot of time on the 1st, 2nd, 3rd day... So, at the end, I don't know in which order we recorded things, I have to remember, but at the end we rushed a bit. Finding the sound, the first and second day, we had to find the sound, exactly as he wanted, you know, so the first day we didn't really record. We worked, worked, worked.[19] (Nakamura, interview by author, 2020).

d'enregistrement ? D'autre part, l'orthographe correcte de SIX-XEN est celle que tu peux lire sur cette page. Je crois qu'il y a un malentendu qui a été énoncé à la radio et qu'il faudrait que vous corrigiez dans les notices de programmes, c'est-à-dire : 'les SIX-XEN sont conçus par Iannis Xenakis spécialement pour les 6 percussionnistes de Strasbourg, et ont été construits par Robert Hébrard.' Je vous embrasse tous à la fois." (Iannis Xenakis, mail to Claude Ricou, December 16, 1985).

[19] "Parce qu'on était cinq jours hein, cinq jours ensemble. On était le matin tôt, le soir tard comme d'habitude. On avait que cinq jours donc… On a pris beaucoup de temps au 1er, 2eme, 3eme jours… Donc à la fin, je sais plus dans quel ordre on a enregistré les choses, il faut que je me souvienne, mais à la fin on s'est un peu dépêchés. Trouver le son, le 1er et

The group made a second recording by the label Denon in June 1988 while on tour in Japan. The musicians in this recording (Jean-Pierre Bédoyan, Jean-Paul Bernard, Guillaume Blaise, Christian Hamouy, Keiko Nakamura, and Vincent Vergnais) represent a new formation of the ensemble. The new formation is because members of the first generation, such as Bouchet, Ricou, and van Gucht, were no longer playing (they were still in administrative roles and artistic direction, guiding the new musicians entering the group).

The group also started to commission and create new pieces with it; then it passed to be a sort of timbre mark of the ensemble with composers working on specific spectral and acoustic phenomena, such as Philippe Manoury, the first new composer to work with Sixxen after Xenakis. Manoury was also so interested in this specific model, and its sonorities were so crucial to his pieces and to new projects that would be created that he tried to find some financial resources to a project to duplicate and produce on a large scale this specific Sixxen. As Jean-Paul Bernard (interview by author, 2019) stated:

> I know that Manoury was disappointed because, as he says, he would have wanted to commercialize it both because it was a 21st-century acoustic instrument, and there was no creation of a new acoustic instrument; and on the other hand, because from the moment that this instrument would have had a commercial value, it meant that all the other ensembles would have had to buy this instrument. Then, the other ensembles that would finally decide to do this saying that "yes, it's a metallophone," but one could almost say, "no, it doesn't work."[20]

Even if Manoury did not accomplish his main objectives, he contacted Xenakis and many musicians to have some support and help, mobilizing an initial group that, unfortunately, was not financially supported[21]. Another interesting experience occurred when the ensemble worked with Lutz Glandien in 1994. This German composer thought it was important to work specifically on the particular frequencies of the Hébrard-Abitbol model. Thus, he recorded and analyzed specifically this Sixxen, providing two comparative images of the frequencies inherent in it (Fig. 9.7 and 9.8).

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2eme jour, il fallait le trouver le son, exactement comme il le voulait, tu vois, donc le premier jour on n'a pas vraiment enregistré. On a travaillé, travaillé, travaillé. Parce que quand on a le micro[phone] ce n'est pas pareil en plus. Mais c'était bien." (Nakamura, interview by author, 2020).

[20] "[...] je sais que Manoury était déçu parce que comme il dit, lui il aurait voulu commercialiser à la fois parce que c'était un instrument acoustique du 21eme siècle, y'a pas eu de création de nouvel instrument acoustique ; et d'un autre parce que à partir du moment où cet instrument aurait eu une valeur commerciale, ça voulait dire que tous les autres groupes auraient dû acheter cet instrument. Là les autres groupes finalement ils se décident à faire ça en se disant « oui c'est un métallophone », mais on pourrait presque dire « non ça ne marche pas »." (Bernard, interview by author, 2019).

[21] Manoury's engagement stimulated the ensemble years later when they thought that a new Sixxen should be constructed. The ensemble asked Manoury some help and, for instance, this project is the last Sixxen the ensemble has created and the actual functional prototype.

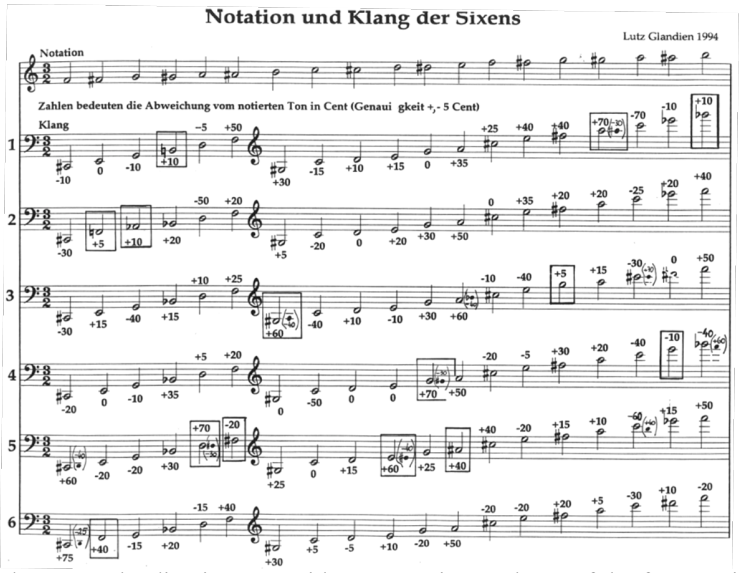


***Figure 9.7***. Table made by Lutz Glandien in 1994 with comparative analyses of the frequencies of the Hébrard-Abitbol model of the Les Percussions de Strasbourg (France). Source: Lutz Glandien's personal archives. © Lutz Glandien.

The image above shows seven staves, the top one exclusively in treble clef and indicative of the notation of the 19 pitches in chromatic scale from $F^4$ to $B^5$ (as discussed previously for the standard notation of the instrument by Xenakis in 1988). The six staves below start with frequencies in the bass clef passing the seventh note to treble clef, and they show the sounds perceived as fundamentals in each of the 19 bars of the six sixxens (from A to F, that Glandien classified as 1 to 6). Because many notes are obviously out of adjustment (when compared to the harmonic pitches on the staff), there is an indication of positive and negative values in cents and of harmony of the relation of pitches (e.g., C plus 70 cents is equal to C# minus 30 cents, and so on, as exposed on the image). These differences in terms of microtonality guided Glandien to produce a second image (Fig. 9.8), where he tabulated each frequency on millimeter paper, trying to understand the interval relationships in micro-structural terms proportionally.

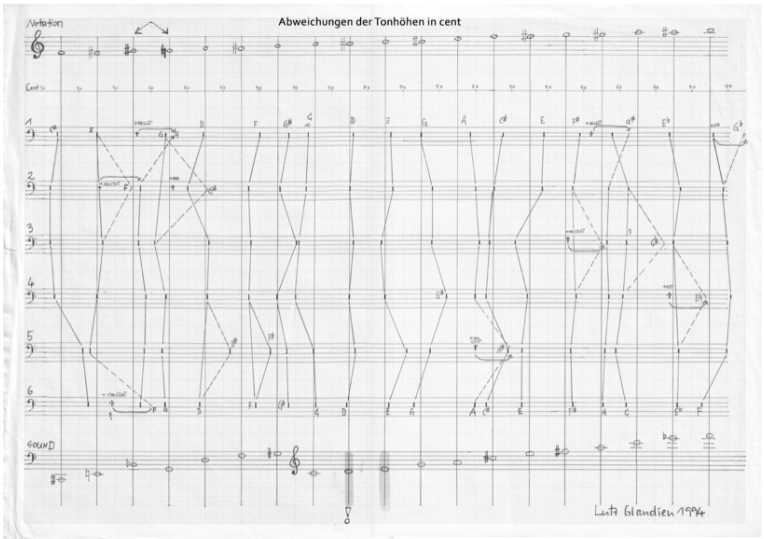


***Figure 9.8***. Comparative analysis of the frequencies inherent in the Hébrard-Abitbol model (France), made by Lutz Glandien in 1994. Source: Lutz Glandien's archives. © Lutz Glandien.

The image above presents thus eight staves constructed on a scale of cents from left to the right. The staff in treble clef on the top of the image presents the notes as they are notated (Xenakis, 1988), and the staff on the bottom of the page (starting with bass clef and turning to treble clef) presents that could be relatively perceived in each sixxen. Then, the six central staves (named 1 to 6) show each sixxen relative to the perceived note. The millimeter paper was divided to make clear in cents the distances between the sixxens that are near the perception of the fundamental or far. This second graphic in millimeter paper highlights, through continuous and dashed lines, how the frequencies are proportionally distancing and approaching each sixxen and from sixxen to sixxen. It puts thus in evidence how comparatively distant the frequencies are between a sixxen and its neighbors (e.g., between sixxen A and sixxen B).

Paul Gueib worked on the new Sixxen for Les Percussions de Strasbourg, but to achieve it, he tried to understand the timbre qualities and frequency characteristics of the Hébrard-Abitbol model. For that, he recorded bars and analyzed their spectrum. Gueib (2020) observed the same phenomena as Lutz Glandien about the irregularity of the presence of frequencies in the range, and he found quite the same notes after almost 26 years separating both researchers. The material suffered some variation and injuries but stayed relatively stable to a material that was undoubtedly used exhaustively. Gueib (2020) also compared the Hébrard-Abitbol model with hypothetical Sixxens with pure and constant distances of a fourth and third, concluding that "the recording and analysis of the instrument's sounds showed that the bars were much closer to quarter-tone spacing than to third-tone spacing. A pitch distribution in thirds of a tone is technically unfeasible because the highest bar would be much too small and impossible to play properly for the musicians."[22] (Gueib, 2020, p. 20).

Kroumata Percussion Ensemble would be interested in the same model some years after the construction by Hébrard-Abitbol (1989), purchasing it with Grimus. However, some characteristics changed, mainly in terms of sonority, reason why Jean-Paul Bernard stated:

> I think he made the Sixxen with... I think it was by chance that he came across what he came across. Because when, as I told you, Kroumata wanted to order the same Sixxen as we did– and they told us afterwards, they said, "We saw you in Taiwan, we looked at the Sixxen, we saw the reference of Hébrard"–so they did their own research, and in fact, they were disappointed because the instrument was... It's not even the same chord, there's nothing. And also, the bars, in my opinion, are not the same, so it doesn't even sound like ours. At least I can tell you that to my knowledge if there is a unique instrument, it's our Sixxens, you won't find them in other places. That's for sure.[23] (Bernard, interview by author, 2019).

[22] "Cependant, l'enregistrement et l'analyse des sons de l'instrument ont démontré que les lames étaient beaucoup plus proches d'un espacement au quart de ton que d'un espacement par tiers de ton. Avoir une répartition des hauteurs en tiers de ton est en fait techniquement irréalisable car la lame la plus aigüe serait beaucoup trop petite, et impossible à jouer convenablement pour les musiciens." (Gueib, 2020, p. 20).

[23] "Je pense qu'il a fait le Sixxen avec… A mon avis c'est par hasard qu'il est tombé sur ce qu'il est tombé quoi. Parce que quand comme je t'ai dit Kroumata a voulu commander les mêmes Sixxen que nous – en plus ils nous l'ont dit après, ils nous ont dit « On vous avait vus à Taiwan, on a regardé sur le Sixxen, on a vu la référence d'Hébrard » – donc ils ont fait leurs propres recherches et en fait ils étaient déçus parce que l'instrument c'était… Ce n'est même pas le même accord, y'a rien quoi. Et en plus les lames à mon avis ce n'est pas les mêmes, ça fait que ça ne sonne même pas comme

Since part of their two first recordings of *Pléïades* (by the well-known record labels Harmonia Mundi and Denon), the reference to new pieces that the ensemble would continuously be commissioning from the second half of the 1980s, and a constant presence in concerts performed all over the globe, the sonority of the Hébrard-Abitbol model was a signature of Les Percussions de Strasbourg. This specific Sixxen appeared in a crucial moment for the ensemble and turned thus to be, in the imagination of many listeners, the most representative of the Sixxen sounds that Xenakis would have produced. However, the composer himself was, once more, not fully satisfied with the instrument, and he thus started a new cooperation to try to achieve the so-desired SIX-XEN. The motifs were mentioned by Nakamura (interview by the author, 2020) that stated:

> The model that we used, the one by Hébrard, was too much beautiful. It was good, it has resonance, it has high harmonics, but it was not [satisfying] for him [Xenakis] yet. I understand what he meant, so he asked Yamaha if it was possible to study it as he wanted. Because Hébrard didn't really study with him while constructing, he was not always with Iannis. Even if they were not very far one from the other, they could go back and forth, but Hébrard built something like that.[24] (Nakamura, interview by author, 2020).

On the other hand, Hébrard's opinion seems to point in another direction. Les Percussions de Strasbourg (2021) contacted him to discuss his creation when they were trying to construct a new prototype, and they stated that:

> The specifications were then rather vague, and the deadline very short because a recording was planned.
> [...] According to Robert Hébrard, it would have taken more time for the model to be completely achieved. However, I. Xenakis was very satisfied with the musical and sound result. The Sixxen is not a good memory for Robert Hébrard because the instrument had problems with the frame and the suspension, which were described as "bricolage." Moreover, because of Xenakis' fame, the instrument was attributed to him and not to its maker.[25]

Hébrard had little time to construct the best possible model in the preferred conditions. This recording was perhaps not the only cause of time constraints. The Hébrard-Abitbol model was premiered during the Festival Musica 85 in September 1985, but the recording occurred only in January 1986. In order to rehearse with this instrument before the concert, they needed it by at least the end of August. Without the premiere at Festival Musica 85, the constructors would have had four

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les nôtres. Au moins je peux te dire qu'à ma connaissance, s'il y a un instrument unique, c'est bien nos Sixxens, tu n'en trouveras pas à d'autres endroits quoi. Ça c'est sûr." (Bernard, interview by author, 2019).

[24] "Oui tout à fait, parce qu'il n'était pas d'accord. Le modèle qu'on utilisait, celui d'Hébrard, il était beaucoup trop beau. Il était bien, la résonnance il en a, les harmoniques aigues il en a, mais ce n'était pas ça pour lui. Je comprends ce qu'il veut dire, mais donc il a demandé à Yamaha si possible d'étudier comme il le souhaitait. Parce que Hébrard il n'a pas vraiment étudié en fabricant, il n'était pas toujours avec Iannis. Pourtant ils n'étaient pas très loin, chez l'un ou l'autre ils pouvaient faire les allers-retours, mais Hébrard il a construit quelque chose comme ça." (Nakamura, interview by author, 2020).

[25] "Le cahier des charges est alors assez vague et le délai très court car un enregistrement est prévu.
[...] Selon Robert Hébrard, il aurait fallu plus de temps pour que le modèle soit complètement abouti. Cependant, I. Xenakis est pour sa part très satisfait du résultat musical et sonore. Le Sixxen n'est pas un bon souvenir pour Robert Hébrard car l'instrument avait des problèmes de châssis et de suspensions, que l'on qualifiait de bricolage. De plus, en raison de la notoriété de Xenakis, l'instrument fut attribué à ce dernier et non à son fabricant." (Les Percussions de Strasbourg, 2021).

additional months to accomplish their task. Another interesting element of the phrase above ("because of Xenakis' fame, the instrument was attributed to him and not to its maker") occurred, but it was not because of the composer's intention. On the contrary, Xenakis expressed in a letter to Ricou in December 1985: "I think there is a misunderstanding that was stated on the radio and that you should correct in the program notes, i.e.: 'the SIX-XEN are designed by Iannis Xenakis, especially for the six percussionists of Strasbourg, and were built by Robert Hébrard'."[26] (Iannis Xenakis, mail to Claude Ricou, December 16, 1985). If attribution to Xenakis as maker occurred, it was because of the press diffusion or the communication made by Les Percussions de Strasbourg, not because of the composer himself.

Even if the December 1985 document mentions that the composer was satisfied with it ("I believe that the sounds of the SIX-XEN are improved."), it was perhaps an initial feeling because he searched for new experiments and a new Sixxen. In this long journey with Les Percussions de Strasbourg, Yamaha was now the possibility to Xenakis to stimulate more research on metals and the development of his instrument, something that he, once more, personally started and encouraged as a process.

### 9.1.3 The unfinished Yamaha prototype (1986-1987)

In 1986, Les Percussions de Strasbourg began to develop a new prototype with Yamaha, which directly involved Xenakis and Keiko Nakamura. It seems that the beginning of this new project was initiated by the composer, as Nakamura stated:

> Yeah, [Xenakis was] always searching. He said, yes, that's good, [the Hébrard-Abitbol model] was better than the first and the second [Sixxens of Les Percussions de Strasbourg]... And a few years later, when... I was still in Frankfurt, so very soon after [the construction of the third Sixxen], he starts saying, "Keiko, can't we maybe ask Yamaha to work together?" So I said okay, we'll work, I'll ask. That's how it started.[27] (Nakamura, interview by author, 2020).

The composer corresponded with representatives of the company visited the company's facilities in Japan, and, in the end, met Keiko Nakamura and staff from Yamaha in Strasbourg to evaluate a prototype in the final stages of testing. Jean-Paul Bernard (interview by author, 2019) also stated, "It was Yamaha who agreed to do this, to make it commercial. So, they said, 'we are going to bring Xenakis,' and they invited Xenakis to Japan at least twice to work on the new Sixxen, to try to

[26] "Je crois qu'il y a un malentendu qui a été énoncé à la radio et qu'il faudrait que vous corrigiez dans les notices de programmes, c'est-à-dire : « les SIX-XEN sont conçus par Iannis Xenakis spécialement pour les 6 percussionnistes de Strasbourg, et ont été construits par Robert Hébrard. »" (Iannis Xenakis, mail to Claude Ricou, December 16, 1985).
[27] "Ouais, [Xenakis cherchait] toujours. Il a dit, que oui, c'est bien, [le modèle Hébrard-Abitbol] était mieux que le premier et le deuxième [Sixxen des Percussions de Strasbourg]… Et quelques années plus tard, quand ça…. J'étais encore à Francfort, donc très peu après [la construction du troisième Sixxen], il commence à dire « Keiko, on ne peut pas peut-être demander à Yamaha de travailler ensemble ? » Donc j'ai dit okay on va travailler, je vais demander. C'est comme ça que c'est parti." (Nakamura, interview by author, 2020).

make an instrument that would be commercialized."[28] In February 1987, the composer received a letter from Shuhei Kawano of the Educational Instruments Design Department. This letter contained a handwritten message, photos, a cassette tape with six timbre profiles recorded, and detailed plans of six potential bar profiles (Fig. 9.9). The letter was also accompanied by the plans describing each bar profile with technical drawings.

**a)** **b)**

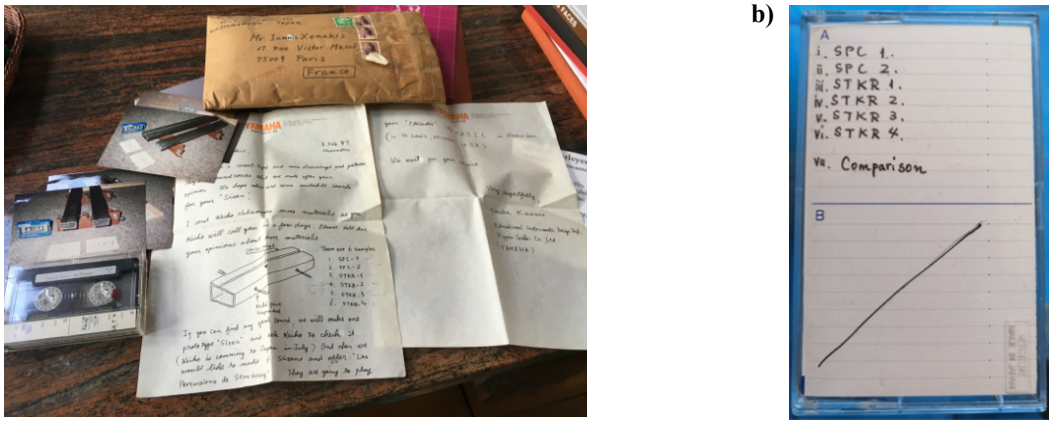


***Figure 9.9***. Exchanges with Xenakis to the construction of a Sixxen by Yamaha. **a)** A letter, photos, a tape and documents exchanged between Yamaha and Xenakis. **b)** Tape sent with recorded examples of six different bar profiles. Source: © Famille I Xenakis DR (Shuhei Kawano, mail to Iannis Xenakis, February 5, 1987).

The handwritten letter also contained a drawing of one of the melodic profiles with details of the attack area and the nodal points (Fig. 9.10). The intention was then for Xenakis to start evaluating the timbres that he thought would be most appropriate so that the company could develop the prototype's other characteristics. When listening to this recording, Xenakis included his opinions on each type of timbre, as shown by the notes that he made by pencil on the letter. As the Yamaha representative made clear, Nakamura could mediate Xenakis's precise clarifications of his personal tastes and his instrument: "I send Keiko Nakamura the same materials as you. Keiko will call you in a few days. Please tell her your opinions about our materials." (Shuhei Kawano, mail to Iannis Xenakis, February 5, 1987).

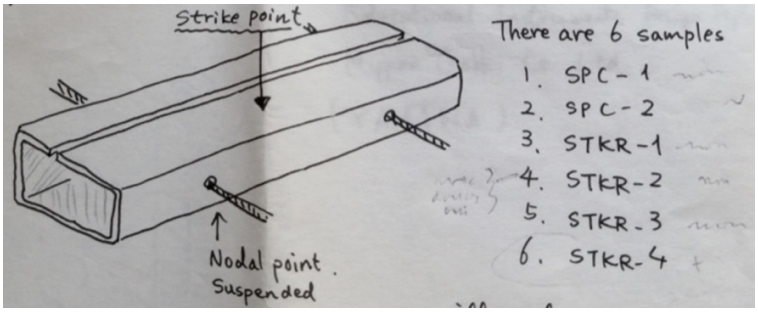


***Figure 9.10***. Part of the letter received from Yamaha with a drawing of one of the bar profiles containing details of the attack area and the nodal points and descriptions of the samples recorded with Xenakis handwritten commentaries. Source: Shuhei Kawano (mail to Iannis Xenakis, February 5, 1987) – © Famille I Xenakis DR.

[28] "Oui c'était Yamaha. Qui était d'accord de faire ça, de commercialiser. Donc ils ont dit « on va faire venir Xenakis » et ils ont invité au moins deux fois Xenakis au Japon pour travailler sur les nouveaux Sixxen, pour essayer de faire un instrument qui serait commercialisé quoi." (Bernard, interview by author, 2019).

Another interesting element is that the company foresaw the possible production of the definitive instrument for 1987. Yamaha's representative even reported that the product would be donated to Les Percussions de Strasbourg and could be available for a concert in the same year showing how far the research was from the company's point of view how near the end of a complete Sixxen they estimated to be. As written to the composer:

> If you can find any good sound, we will make one prototype "Sixen," and ask Keiko to check it (Keiko is coming to Japan in July). And then we would like to make 6 Sixens and offer "Les Percussions de Strasbourg." They are going to play your "Pléïades" by P.A.S.I.C. in November (in St. Louis, Missouri [sic], USA).
> We wait for your advice.
> Very respectfully (Shuhei Kawano, mail to Iannis Xenakis, February 5, 1987).

No answer by Xenakis was found, but one of the rare moments in which the composer mentioned this project was during an interview in 1989 with Vargas (1996, p. 180) when he stated: "Yamaha in Japan was going to be involved [with the production of Sixxen], but I don't know how far that has developed." However, according to personal statements, the composer seems to have gone to Japan to test some materials and wished to incorporate substantial new modifications into what was presented to him. This example could represent a continuous phase of experimentation and testing that no longer seemed feasible for the company. The final Sixxen was not constructed, and this is a consequence of some meetings in which Xenakis was always asking for something new for the Yamaha engineers, and when they achieved it, he required another new thing. In this persistent process, the representatives of Yamaha started to want to finish the process and present a product. As Nakamura stated, the meetings occurred mainly in Strasbourg and Paris. Thus, after many exchanges, a specific meeting organized by Nakamura in Strasbourg with the composer and two Yamaha staffers would officially present a potential prototype. As Nakamura described:

> As I took the responsibility of this matter, I contacted them–they came with the bars. So Iannis also came, we listened, and that's when the Yamaha people went crazy. But really, because Iannis tried all the bars and he didn't agree, he didn't like, and he tapped in all directions, all sides, and he liked a sound which is difficult to put in instrument: the corner of a bar, for example, if you take a vibraphone bar, not on the flat of the bar, but on the side. And he liked this sound, and then the Yamaha people started to go crazy, they were really going crazy. "But how are we going to make an instrument with that? It's impossible to build." And so, we had some exchanges after that with Yamaha and Iannis too, but Yamaha gave up a few years later. They continued the study one more year, but it didn't work.[29] (Nakamura, interview by author, 2020).

[29] "Moi comme je prenais la responsabilité de cette affaire, j'ai contacté – ils sont venus hein, avec les lames. Donc Iannis aussi est venu, on a écouté et c'est là que y'a les gens de Yamaha qui a pété les plombs. Mais vraiment, parce que Iannis il a essayé toutes les lames et il n'était pas d'accord, il n'a pas aimé, et il a tapé dans tous les sens, tous les côtés, et il a aimé un son qui est difficile à mettre en instrument : le coin d'une lame, par exemple si tu prends une lame de vibraphone, pas sur le plat de la lame, mais sur le côté. Et il a aimé ce son et alors là les gens de Yamaha ils commencent à péter les plombs, vraiment ils faisaient la tête quoi. « Mais comment nous on va faire un instrument avec ça quoi, c'est impossible de construire. » Et du coup on a eu quelques échanges après ça avec Yamaha et Iannis aussi mais Yamaha a baissé les bras quelques années plus tard. Ils ont continué l'étude une année de plus mais ça n'a pas marché." (Nakamura, interview by author, 2020).

This points to an interesting situation. Xenakis was more interested in the process of searching; achieving something definitive was not really the point. The ongoing research was not a problem for him; maybe it was even the main priority. The fact that one idea was bringing another, and one process was stimulating another, was a fundamental resource of stimulus for Xenakis. He knew that a company such as Yamaha could have some commercial interest in his instrument and the simplification and the reduction of his potentially diverse concept to a unique prototype was not his objective. The presence of a model with a commercialization impact that Yamaha could invest in was not the main perspective that Xenakis visualized in his SIX-XEN. It could happen, but he was searching for more perspectives, tests, experiments, and ways to improve his search for a timbre and a complete instrument. The journey of Les Percussions de Strasbourg was still not finished yet. In the second half of the 2010s, they started a new project to renew the Hébrard-Abitbol model or to construct a new Sixxen.

### 9.1.4 ENSAM / Thinktone / *Rythmes et Sons* model (2021)

Les Percussions de Strasbourg worked on a new Sixxen (the fifth one in terms of development of research but the fourth one accomplished). It was specially developed for the centenary of Xenakis' birthday, the sixtieth anniversary of the ensemble, and the recording of the third version of *Pléïades* (in a new album with *Persephassa*). With the confluence of both commemorations starting to be organized, they started in 2018 to exchange with Philippe Manoury. Manoury had previously worked with the group and exchanged with Xenakis, having tried to find some funding to develop Sixxens in the 1990s. The first meetings focused on whether the Hébrard-Abitbol model should be renewed or a new instrument should be constructed. Then, if it was the case of a new instrument, to decide if it should be based on a previous instrument elaborated with Xenakis or if it should be a completely new project, reflecting an integrally new approach. They decided to stay close to the model developed by Hébrard-Abitbol, searching for the characteristics based on this Sixxen but with some improvements and enhancements based on innovative solutions to some problems. As stated by Les Percussions de Strasbourg in a document announcing the research and development of the new prototype and to search for a partnership for its construction:

> The current Sixxens are still functional, but they are beginning to show significant signs of age from time and use. They are also very difficult to disassemble and very bulky, which strongly limits the possibility to move them for performances. The main innovations concern the frame, the dampers, the pedal, the possibility of removing the bars to play them individually, as well as the ease of packaging to go on tour. The ensemble hopes to be able to preserve [the Hébrard-Abitbol model,] a unique original object, a key element in the history of contemporary percussion.[30] (Les Percussions de Strasbourg, 2021).

[30] "Les Sixxens actuels sont encore utilisables, mais ils commencent à montrer d'importants signes de vieillissement sous l'effet du temps et de l'utilisation. Ils sont également très difficiles à démonter et très encombrants, ce qui limite fortement la possibilité de les déplacer pour des représentations. Les principales innovations concernent donc le châssis, les

With this decision taken, a new phase just started. Thus, in 2019 the percussionists started to search for professionals that could contribute to the project, and they integrated the company *Rythmes et Sons*, the ThinkTone Association, as well as students and professors of the *École Nationale Supérieur Arts et Métiers* (ENSAM) in Metz (France)[31]. Thus, the project developed a new prototype that was partially tested in 2020 and was definitively finished at the beginning of 2021, giving Les Percussions de Strasbourg the possibility to record on the definitive model on July 17 and 20, 2021 (at the *Théâtre de Hautepierre*, Strasbourg, France). Careful research was done on the spectral characteristics and the morphologies of the bars (by recording and analyzing the frequencies in relation to the dimensions of each bar), as well as a verification of the previous construction details and the problems that the musicians were having with it to achieve the definitive instrument. This research developed as part of a Bachelor's Degree work presented by Paul Gueib (2020).

When projecting the future instrument to be developed, Les Percussions de Strasbourg (2021) stated that:

> The properties of the bars will remain unchanged and will be made of the same alloy as at present: Duralumin 2017A. The new version of the Sixxen will keep the sound, the harmonics, the resonance, and the projection of the original instruments. It will be designed in such a way that the bars can be used independently more easily. We are looking for the possibility to create a keyboard that would be different from Xenakis'.[32]

Thus, this Sixxen is based on the Hébrard-Abitbol model, which is why it presents the same kind of metal (duraluminum), the same bar profile (inverted-U of unequal sides), and the exact dimensions and proportions (Fig. 9.11a). However, some aspects of the frame changed; a new kind of pedal and dampening mechanism was also developed (Fig. 9.11b), and the bars acquired a new tuning and also a new color (Fig. 9.11c). Even if it was developed mainly searching for the same specificities in the timbre that the Hébrard-Abitbol model initially proposed, this specific Sixxen is marked by considerable changes and some very innovative solutions in terms of frame and dampening mechanism. Thus, a custom-made and independent frame for each one of the 114 bars, including an individual rope suspension and tensioning system, was elaborated. This was developed to facilitate the instrument's assembly and disassembly, but it could also be possible to use only some bars of the Sixxen independently if a composer would require it.

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étouffoirs, la pédale, la possibilité de retirer les lames pour les jouer individuellement, ainsi que la facilité de conditionnement pour partir en tournée. L'ensemble espère ainsi pouvoir conserver un objet d'origine unique, élément capital de l'histoire de la percussion contemporaine." (Les Percussions de Strasbourg, 2021).

[31] ENSAM, also called *Arts et Métiers*, is a leading engineering school, offering generalist and specialty engineering programs, a Bachelor of Technology program, as well as Master and Doctorate degrees. ENSAM has the status of a public institution of a scientific, cultural and professional nature (EPCSCP, in French *Établissement public à caractère scientifique, culturel et professionnel*), and as such is under the supervision of the Ministry of Higher Education and Research (*Ministère de l'Enseignement supérieur et de la Recherche*).

[32] "Les propriétés des lames resteront inchangées et seront du même alliage qu'actuellement : le Duralumin 2017A. La nouvelle version du Sixxen conservera ainsi le son, les harmoniques, la résonnance et la projection des instruments d'origine. Elle sera pensée de manière à pouvoir utiliser les lames indépendamment, plus facilement. Nous recherchons ici la possibilité de créer un clavier qui serait différent de celui de Xenakis." (Les Percussions de Strasbourg, 2021).


***Figure 9.11***. Last Sixxen developed for Les Percussions de Strasbourg. **a)** General view of a sixxen. **b)** Detail of the pedal and mechanism to have the pedal always activated. **c)** Profile of the bars. Source of all: Photo by the author.

The pedal was renewed entirely so that it functions with the same principles as a vibraphone pedal (the bars are always dampened, and when the pedal is activated, the bars are free), but it also presented a mechanism to have the pedal always activated without human interference, so that the bars could always be free with full resonance. This instrument could represent a new phase in the history of the ensemble. It started with an amazing collaboration with researchers, engineers, and musicians, bringing potential new collaborations for more pieces and spectacles.

### 9.1.5 Recordings sent to Xenakis

Excluding the last prototype, all of the Sixxen prototypes that the ensemble developed were recorded and sent to Xenakis. They exchanged many recordings, and the composer integrated them into his collection, archived at the BnF. The exchanges concerning the prototypes were accomplished through two concentrated periods (1979 and 1985–1986). In 1979, at least four recordings of the Kolberg-*Rythmes et Sons* prototype were produced and sent to Xenakis (archived at the BnF as DONAUD 0604 99—Xenakis 102, DONAUD 0604 126—Xenakis 129, DONAUD 0604 260—Xenakis 266, DONAUD 0604 527—Xenakis 550), and in 1985-1986 at least six tied to Hébrard-Abitbol model were produced and sent (DONAUD 0604 994—Xenakis 1049, DONAUD 0604 1028—Xenakis 1084, DONAUD 0604 991—Xenakis 1046, DONAUD 0604 363—Xenakis 376, DONAUD 0604 992—Xenakis 1047, DONAUD 0604 82—Xenakis 85). This material could be of interest for specific research in acoustic characteristics of the Sixxen developed with Xenakis.

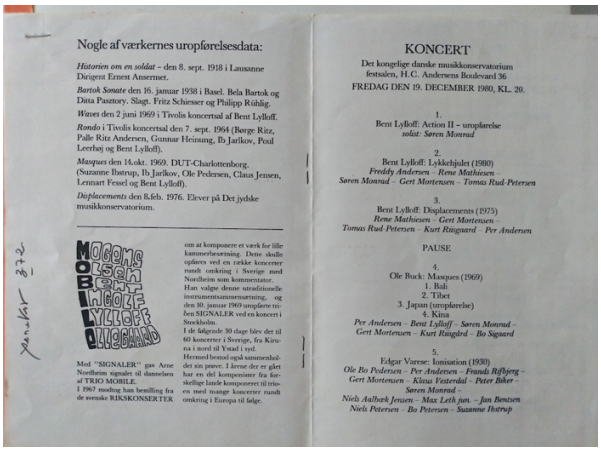
## 9.2 Percussion groups and the development of new prototypes in the 1980s and 1990s

In the following section, several ensembles that created their own versions of the Sixxen to present *Pléïades* will be listed. Almost every group that constructed the instrument in the 1980s contacted Xenakis. As will be explained here, numerous contacts were made, and the composer proceeded with each one differently.

### 9.2.1 Copenhagen Percussion Ensemble (Denmark, 1980)

The second group to develop a Sixxen was the Copenhagen Percussion Ensemble (in Danish: *Københavns slagtøjsensemble*) in 1980. The information that this group played the piece that year came from material found in the BnF. There, it was possible to access a tape and the program notes of the concert (the material was referenced as DONAUD 0604 359—Xenakis 372), which were among Xenakis' belongings (Fig. 9.12).

**a)**



Nogle af værkernes uropførelsesdata:

*Historien om en soldat* – den 8. sept. 1918 i Lausanne Dirigent Ernest Ansermet.

*Bartok Sonate* den 16. januar 1938 i Basel. Bela Bartok og Ditta Pasztory. Slagt. Fritz Schiesser og Philipp Rühlig.

*Wazes* den 2 juni 1969 i Tivolis koncertsal af Bent Lylloff.

*Rondo* i Tivolis koncertsal den 7. sept. 1964 (Børge Ritz, Palle Ritz Andersen, Gunnar Heinsung, Ib Jarlkov, Poul Leerbøj og Bent Lylloff).

*Masques* den 14.okt. 1969. DUT-Charlottenborg. (Suzanne Ibstrup, Ib Jarlkov, Ole Pedersen, Claus Jensen, Lennart Fessel og Bent Lylloff).

*Displacements* den 8.feb. 1976. Elever på Det jydske musikkonservatorium.

MOGENS ELLEGAARD BENT LYLLOFF INGOLF OLSEN

Med "SIGNALER" gav Arne Nordheim signalet til dannelsen af TRIO MOBILE. I 1967 modtog han bestilling fra de svenske RIKSKONSERTER om at komponere et værk for lille kammerbesætning. Dette skulle opføres ved en række koncerter rundt omkring i Sverige med Nordheim som kommentator. Han valgte denne utraditionelle instrumentsammensætning, og den 30. januar 1969 uropførte trioen SIGNALER ved en koncert i Stockholm. I de følgende 30 dage blev det til 60 koncerter i Sverige, fra Kiruna i nord til Ystad i syd. Hermed bestod også sammenholdet sin prøve. I årene der er gået har en del komponister fra forskellige lande komponeret til trioen med mange koncerter rundt omkring i Europa til følge.

KONCERT

Det kongelige danske musikkonservatorium festsalen, H.C. Andersens Boulevard 36

FREDAG DEN 19. DECEMBER 1980, KL. 20.

1. Bent Lylloff: Action II – uropførelse *solist: Søren Monrad*

2. Bent Lylloff: Lykkehjulet (1980) *Freddy Andersen – Rene Mathiesen – Søren Monrad – Gert Mortensen – Tomas Rud-Petersen*

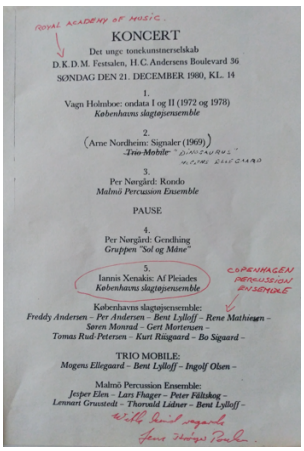
3. Bent Lylloff: Displacements (1975) *Rene Mathiesen – Gert Mortensen – Tomas Rud-Petersen – Kurt Rüsgaard – Per Andersen*

PAUSE

4. Ole Buck: Masques (1969) 1. Bal 2. Tibet 3. Japan (uropførelse) 4. Kina *Per Andersen – Bent Lylloff – Søren Monrad – Gert Mortensen – Kurt Rüsgård – Bo Sigaard*

5. Edgar Varese: Ionisation (1930) *Ole Bo Pedersen – Per Andersen – Frands Rifbjerg – Gert Mortensen – Klaus Vesterdal – Peter Biker – Søren Monrad – Niels Aalbæk Jensen – Max Lath jun. – Jan Bentzen Niels Petersen – Bo Petersen – Suzanne Ibstrup*

**b)**



ROYAL ACADEMY OF MUSIC

KONCERT

Det unge tonekunstnersekskab D.K.D.M. Festsalen, H.C. Andersens Boulevard 36

SØNDAG DEN 21. DECEMBER 1980, KL. 14

1. Vagn Holmboe: ondata I og II (1972 og 1978) *Københavns slagtøjsensemble*

2. (Arne Nordheim: Signaler (1969)) *Trio Mobile*

3. Per Nørgård: Rondo *Malmö Percussion Ensemble*

PAUSE

4. Per Nørgård: Gendhing *Gruppen "Sol og Måne"*

5. Iannis Xenakis: Af Pleiades *Københavns slagtøjsensemble*

COPENHAGEN PERCUSSION ENSEMBLE

Københavns slagtøjsensemble: *Freddy Andersen – Per Andersen – Bent Lylloff – Rene Mathiesen – Søren Monrad – Gert Mortensen – Tomas Rud-Petersen – Kurt Rüsgaard – Bo Sigaard –*

TRIO MOBILE: *Mogens Ellegaard – Bent Lylloff – Ingolf Olsen –*

Malmö Percussion Ensemble: *Jesper Elen – Lars Hager – Peter Fältskog – Lennart Grusstedt – Thorvald Lidner – Bent Lylloff –*

***Figure 9.12***. Program notes of the Copenhagen Percussion Ensemble (*Københavns slagtøjsensemble*) presenting *Pléïades* in 1980. **a)** Complete program notes. **b)** Detail of the repertoire and musicians involved with notes made by Jens Krøyer Poulsen (sound enginner that sent the recording to Xenakis). Source: BnF (DONAUD 0602 359–Xenakis 372).

This material shows that the concert occurred on December 21, 1980, at the concert hall of the Royal Danish Conservatory of Music (in Danish: *Det Kongelige Danske Musikkonservatorium*—D.K.D.M.), which presented, in addition to Xenakis' *Pléïades*, pieces by Per Nørgård and Vagn Holmboe. The ensemble was significantly attached to this music education institution, and the performance was part of a series of the percussion group's concerts, including Trio Mobile and Malmö Percussion Ensemble. The musicians of the Copenhagen Percussion Ensemble were Freddy Andersen, Per Andersen, Bent Lylloff, Rene Mathiesen, Søren Monrad, Gert Mortensen, Tomas Rud-Petersen, Kurt Rüsgaard, and Bo Sigaard. It is not clear in the program found in the BnF who played each piece and in which order the movements of *Pléïades* were presented (but consultation of the recording reveals that the order was «*Mélanges*», «*Métaux*», and «*Peaux*», with «*Claviers*» not being

presented). The sound engineer of the recording was Jens Krøyer Poulsen, who later sent all of the material to Xenakis (as attested by his handwritten message to the composer on the program).

The sonority of this Sixxen was very particular, and it is perceptible that many different types of metal, shapes of bars, pitch ranges, and resonance properties characterized the prototype. The set was assembled with thunder sheets, muffled gongs, pipes, pans, and other hugely diverse metallic materials from different sources. In an exchange with Gert Mortensen, he stated, "At that time our Sixxen was a very poor one, actually completely wrong made. We didn't have the right info and understanding how to create a real Sixxen at that time." (Gert Mortensen, email to author, November 26, 2020).

Aside from the material that Xenakis received and is currently at the BnF, no other exchanges were found. However, because of that recording, the composer probably changed some aspects of the description of the instrument, and he started to indicate the recording of Les Percussions de Strasbourg in Baden-Baden as a reference[33].

### 9.2.2 Oberlin Percussion Group and Michael Rosen (USA, 1981)

The Oberlin Percussion Group was created in 1972 under the direction and guidance of Michael Rosen and is connected to an educational institution, the Oberlin Conservatory of Music. This group was responsible for the American premiere in November 1981 at Oberlin College (Ohio). The composer was present at the group's performance (in which the order of the movements was the following: «*Mélanges*», «*Claviers*», «*Métaux*», and «*Peaux*») and was then able to give his opinion about the prototype that they built.

Xenakis' connection with the Oberlin Percussion Group occurred through contact with Michael Rosen. This is extremely interesting because it shows that the composer wanted to promote his piece among percussion groups from different countries, encouraging them to build prototypes of the SIX-XEN. This is an essential factor in understanding the composer's approach to his work and the construction of his instrument. Rosen was already familiar with the composer (they met in Toronto for a performance of *Persephassa* in 1977), and then Xenakis made contact to propose that the piece be played at Oberlin. In a letter to Rosen at the beginning of 1981, Xenakis stated that he would tour the USA[34] in order to give a lecture and present acousmatic pieces and that the group directed by Rosen could play the two works for the percussion ensemble that he had composed by that point. As the composer wrote:

> Dear Mike,
> I was very moved by your letter in which you tell me that you give me the fee of your appearances. Of course, I cannot accept this sort of arrangement.
> Your proposal to come to Oberlin around November 7th through 11th is agreeable, perhaps

[33] See more details in Chapter 3–Subchapter 3.1.
[34] For more details about this USA tour in 1981, see Turner (2014).

> if you could perform with your Group both “Persephassa” and “Pleïades” together with a lecture by me. I could also, during my stay there, play the “Legend of Eer,” which is for seven-track tape or for four stereo tape recorders provided that there are at least seven good loud-speakers of the kind of Altec “voice of the theater.”
> This piece last 46 minutes, and in combination with it, I could also played [sic] some other electronic music of mine in order to form a full concert program of 75 minutes at least.
> (Iannis Xenakis, mail to Michael Rosen, February 28, 1981).

Referring to the construction of the Sixxen, Rosen said: “I can tell you that I followed Xenakis’ instructions and built the Sixxen that way. It took a long time to make them, and they were very difficult to tune” (Michael Rosen, email to author, March 30, 2020). The prototype that Rosen built then was made of pieces of stainless steel that, as described by himself, varied in size from about 5cm square to about 5cm x 25cm long, depending on the pitch. Rosen stated that Xenakis was not satisfied with this material and complemented that:

> When he got here, he didn’t like them but let us play them in the concert because there was no time to make others. After our first performance in the US, he went to Toronto, where the piece was played by members of Nexus. Bob Becker told me that he also made Sixxens that were different than mine, but Xenakis didn’t like them either. (Michael Rosen, email to author, March 30, 2020).

Then, after the concert, Xenakis reiterated that he was not so convinced by this prototype and, as Rosen (interview by author, 2021) would state later, “He just expressed his dislike. He said: That’s not what I meant! And, of course, I said: But that’s what you wrote! [...] You know he was very vague about it at the end...” Even though the sound of their Sixxen did not convince him, Xenakis invited them to play it in Europe. As Rosen also explained: “He did invite us to come to France to perform the piece, but we couldn’t agree on how to pay for the trip.” (Michael Rosen, email to author, March 30, 2020).

### 9.2.3 New Music Concerts and Nexus (Canada, 1981)

After the concerts in his 1981 tour of the USA, Xenakis went to Canada, where he had two concerts sponsored and organized in Toronto by New Music Concerts (NMC), a series of spectacles that was directed at the time by Robert Aitken (Fig. 9.13). These concerts occurred on November 27 and 28, with *Bohor* (1962) and *La légende d’Eer* (1977) on the first night and *Theraps* (1976) and *Pléïades* (presented in the order «*Mélanges*», «*Claviers*», «*Métaux*», and «*Peaux*») on the second. Both concerts were presented at York University, and the group for this Canadian premiere included Robert (Bob) Becker, John Brownell, David Campion, Robin Engelman, Russel Hartenberger, and Beverley Johnston. Part of the group (Becker, Engelman, and Hartenberger) created and worked as members of Nexus, a professional percussion ensemble founded in 1971 (still in activity); however, this famous ensemble did not use the Sixxen again in their repertoire.

a) b)

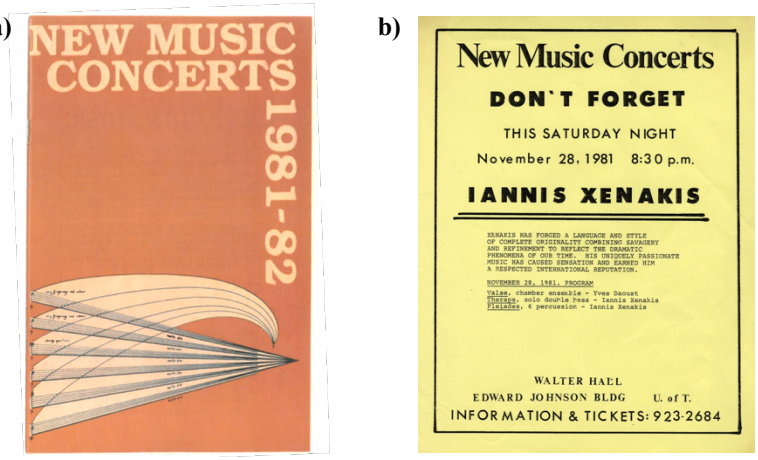



***Figure 9.13***. Concerts by New Music Concerts (NMC) directed by Robert Aitken. **a)** Poster of the concert. **b)** Flyer with the program of both nights. Source: © NMC.

Concerning the premiere, Bob Becker explained:

> NMC often invited major composers to come to Toronto to take part in the preparation of their pieces. The sixxens that were made here had to be fabricated well in advance of Mr. Xenakis's arrival, and so he had no direct input in their design or construction other than the instructions provided in the score. I was not personally involved in the project either, and as I recall, Mr. Engelman contacted the father of one of his students and asked him to produce the instruments following the instructions as he understood them. I didn't see the sixxens myself until the first rehearsal, well before Xenakis arrived in Toronto. I did not speak with Xenakis regarding the instruments at all, although Mr. Engelman said Xenakis was disappointed in them, at least compared to other versions he had heard previously. I personally had no correspondence with Xenakis nor any direct conversations with him about the instruments. My recollection is that he was happy with the performance of the piece, but not with the sound of the sixxens. (Robert Becker, email to author, April 10, 2020).

Robert Aitken, the artistic director of the NMC at that time, contacted Xenakis for more precise information about the construction of the Sixxen. As he described:

> On the telephone, he simply could not describe what he wanted aside from the fact the six percussionists needed to play tuned metal instruments with 19 pitches each, and the pitches of all the players had to be different. He did not seem to care what they were made of or how they were shaped as long as they were metal. I telephoned to the Percussion de Strasbourg, and they were very protective of information about what they had played. And Xenakis could not describe what they used either. (Robert Aitken, mail to the author, November 28, 2020).

Many details in this description were recurrent, but the open mind of the composer toward the type of metallic material and its characteristics is evident. Robin Engelman, who was responsible for the construction of the prototype, declared that:

> *Pleiades* requires six instruments which Xenakis claimed to have invented but never built. He called these "imaginary" instruments Sixxen.
> If memory serves, Xenakis' description of Sixxen was vague. Each Sixxen was to consist of 19 slightly out-of-tune metal bars pitched within a tessitura similar to each but avoiding unisons. The father of a percussion student at the University of Toronto faculty of music worked in a foundry about 45 miles north of Toronto. He made these instruments free of charge and delivered them to Walter Hall.
> They arrived covered with oil, grime, and metal filings. By the time they were unloaded and ready to be played, our hands were filthy. (Engelman, 2010).

Bob Becker was more precise about their prototype, describing it as made of large round steel

pipes with an outside diameter of approximately 2 inches and a thickness of at least 1/8 of an inch. He stated, “The tubes on each instrument were welded to a single steel cross brace, which made them look like miniature marimba resonator banks.” (Robert Becker, email to author, April 10, 2020).

In his description of the instrument, Aitken pointed to a slightly different material, stating that:

> One of our percussionist’s father owned a steel mill and suggested making six instruments of solid steel shaped like combs with every tooth on the six combs at different lengths. We all thought it as a wonderful idea as each tooth should have a different controlled pitch, and being made of steel, could stand the impact of being played by hammers which Xenakis required. Well, Iannis thought it was a great idea until we tried it out. The pitches on each instrument were almost the same because the entire comb was cut from one piece of steel. It was too late to find another solution, so that is what we used for the Toronto premiere. Xenakis, as always with his unbearably loud pieces, stood in the middle of the *ffffff* rehearsals without ear plugs.
> The Percussion de Strasbourg continue to rent out an instrument they call a Sixxen, but I honestly don’t think anyone has come up with the instrument Xenakis had in his imagination. (Robert Aitken, mail to the author, November 28, 2020).

Engelman described a little about the rehearsals with the composer and affirmed that:

> Xenakis arrived to coach the last couple rehearsals. As soon as he heard our version of his imaginary Sixxen, he objected, stating that the sound was not at all what he had in mind.
> I remember being struck by the fact that he was ungracious. He didn’t thank us or recognize in any manner our attempt to realize his sometimes fanciful instructions, but still, his program note claimed the Sixxen were his invention and the heart of *Pleiades*. Many years later, I learned that Xenakis had objected to the original Sixxen built by the Strasbourg Percussion Ensemble and, indeed, to every Sixxen built during his lifetime. (Engelman, 2010).

Becker reported that NMC or Nexus no longer used this prototype after this concert and did not get to work with composers to create new pieces and develop a repertoire for it. The prototype was, thus, essentially built for only one exclusive concert.

### 9.2.4 Nieuwe Slagwerkgroep Amsterdam (the Netherlands, 1983)

The professional group Nieuwe Slagwerkgroep Amsterdam (NSA)—also called the New Amsterdam Percussion Group—was founded in 1980 by two solo percussionists in the Concertgebouw Orchestra, Jan Pustjens, and Niels Le Large. Some musicians were fixed members (Herman Rieken, Peter Prommel, Ruud Wiener, Jan Pustjens, and Niels Le Large), but the NSA also played with fewer or more percussionists according to the demands of the repertoire. In the first five years of its existence, the Nieuwe Slagwerkgroep Amsterdam produced many concerts with various artistic propositions, including all of *Pléïades* in 1983 (they started playing only «*Peaux*» in 1982). Peter Prommel, Herman Rieken, Paul Lemaire, Toon Oomen, Johan Faber, Michael de Roo were the percussionists, and Jan Pustjens conducted. This concert occurred on May 8, 1983, at the Concertgebouw (Fig. 9.14); it was recorded, and Xenakis received this tape (which was later archived at the BnF).

a)


b)


Veel kosmisch vertoon bij Xenakis' „Pléiades"

„Midden in de sterrenclusters Pleiaden (ook wel Zevengesternte genoemd) staat Plejone, de ster die met een snelheid van 300 kilometer per seconde om haar as draait. Zo snel dat zij een ononderbroken stroom gas de ruimte inslingert, waarbij de ultraviolette straling haar materie verblindend doet oplichten". Dit programmaetuitje bij de uitvoering van Iannis Xenakis' „Pléiades" voor uitgebreid slagwerkensemble in de moderne C-serie van het Concertgebouworkest wijst niet in de richting van een symfonisch gedicht. Toch greft het als overdrachtelijk beeld rank de stemming en klankwereld weer, die de componist in zijn vierdelige partituur heeft gereserveerd.

In 'Mélanges' (vermengingen), Claviers (toetsen, mallets), Peaux (vellen) en Métaux (metalen) heeft hij in een overzichtelijke structuur, soms in bikkelharde toonformaties, met ijzeren logica en weerbarstige harmonische combinaties, menigmaal de suggestie van kosmische visioenen gegeven. Razende ritmen, gesyncopeerd en in duizelingwekkende vaart voortbijschietend, versterken dat idee en stellen de uitvoerenden vaak voor de onmogelijkste eisen. Hiervan hebben de leden van de Nieuwe Slagwerkgroep Amsterdam onder leiding van Jan Pustjens vol inzet en vakkennis voldaan, zodat deze drie kwartier durende ruimtereis een spannend avontuur kon beteken.

Een eigen sfeer, met iets van de bedwelming die sommige van de zogenaamde minimal music kan uitgaan, schenkt het korte „Changing Woods", door collega Ruud Wiener vorig jaar voor drie marimba's gecomponeerd. Inderdaad een spel van over en in elkaar vergliidende akkoordenschema's. Het al ruim vercijfe jaar geleden geschreven „Labyrinth III" van de Amerikaan Lou Harrison, waarvan rasp en ratels, gerucis en gepiep, zingende zaag en rammelaar, tromsen in allerlei maten en soorten, remtrommels, blikken, bloempotten en ijzeren pijpen te pas kwamen, naast Aziatische gongen en tempelbellen; is door de betrekkelijk eenvoudige opzet en ritmiek en zijn licht oriëntaalse tint een gemakkelijk aanspreekend stuk voor de doorgewinterde concertganger anno 1983.

Mia Alexen-Vrucken

***Figure 9.14***. Concert of *Pléïades* by the Nieuwe Slagwerkgroep Amsterdam at the Concertgebouw. **a)** Poster of the concert. **b)** Journal with critiques of the concert. Source of both: Ruud Wiener's personal archives.

The contact with Xenakis came from the ensemble through Ruud Wiener, which stated: "I think the contact with Xenakis was around the second half of 1982, or maybe even before, but I am not sure. I have an October letter from him… I wrote before, questions about this instrument, which was maybe in September 1982." (Wiener, interview by author, 2020). Thus, when they started to conceive their prototype for the performance in the Concertgebouw, they realized that there was no detailed description of what the Sixxen should be. When they contacted the composer[35], he answered:

> Dear M. Wiener,
> I am sorry that the score of PLEIADES did not include the guidelines for the instruments and specially for the "metaux." This is an editor's fault. I am sending you now both program notes in French and performing notes in English.
> Besides, Sylvio Gualda will [...] send you more construction details of the SIXXEN, which is the name for this metallic instrument.
> We have studied with a constructor this Sixxen lately, and it looks more or less satisfactory, but there is no objection that you try again in order to obtain much better results.
> I am very pleased that your ensemble NSA is going to perform PLEIADES in Amsterdam. If there is another question, please write me.
> Yours sincerely (Iannis Xenakis, mail to Ruud Wiener, October 29, 1982).

The prototype they developed as a consequence of the exchanges was made by Pustjens Percussion Products (a company founded by Jan Pustjens in 1980). According to Ruud Wiener, Jan Pustjens was responsible for the construction of the prototype, and he chose to work with a metallic material and bar shape similar to those of vibraphone bars. The company also never offered the prototype for purchased or received new orders for it. As Wiener affirmed, even though they presented the piece many times, the group never commissioned new repertoire for the instrument or worked with composers to include it in new pieces.

Two recordings of this prototype were sent to Xenakis and are currently stored at the BnF with

[35] Wiener wrote to Xenakis: "Our primary question concerns a basic physical description of the instruments: What did you exactly have in mind and are there any drawings available? Any specific thoughts as to the material to be used in the construction of the instruments would also be most welcome." (Ruud Wiener, mail to Iannis Xenakis, October 12, 1982).

the reference numbers DONAUD 0604 887—Xenakis 940 and DONAUD 0604 993—Xenakis 1048. Both recordings are associated with concerts in the Concertgebouw on May 8, 1983, and February 1985. Unfortunately, no comments by Xenakis about this prototype or these recordings were found.

### 9.2.5 Warsaw Percussion Group (Poland, 1983)

Xenakis went to Poland on different occasions, and his initial reception there was very successful, thus strengthening his contacts over the years. As Harley (2004, p. 33) mentioned, "He was received like a hero at the 1962 Warsaw Autumn Festival, where *Pithoprakta* was performed." In June 1980, the Polish Composers' Union invited him to Warsaw and Krakow to give a series of lectures and present his pieces. In 1984, he returned for a series of lectures, and their transcriptions were translated into Polish and published by the Polish Society for Contemporary Music[36]. Some of his pieces were created there, such as *Oophaa* (1989) for harpsichord and percussion, which was performed in the Warsaw Autumn (Warszawska Jesień) by Elisabeth Chojnacka and Sylvio Gualda in 1989. Thus, with the great esteem the composer received from Polish musicians, it is not surprising that a percussion group would invest in playing his chamber pieces.

The Polish premiere of *Pléïades* (Fig. 9.15) occurred during the 26th Warsaw Autumn at the Warsaw Philharmonic Concert Hall (Polish National Concert Hall) on September 20, 1983. The musicians were Stanisław Hałat, Bogdan Lauks, Stanisław Proksa, Hubert Rutkowski, Stanisław Skoczyński, and Barbara Urbaniak. It seems that the order of movements was «*Mélanges*», «*Métaux*», «*Claviers*», and «*Peaux*».

**a)** **b)**

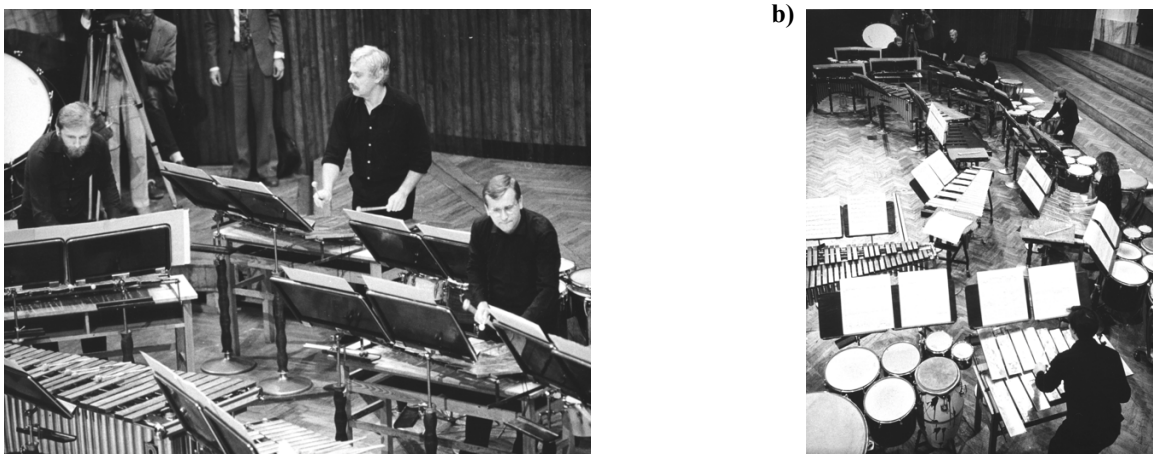


***Figure 9.15***. Warsaw Percussion Group performing *Pléïades* during the Polish premiere that occurred at the 26th Warsaw Autumn. Source of both: © POLMIC.

Today, the main aspects of the specific Sixxen that the ensemble created can only be found in photos of the event, which highlight an inverted U profile, but the type of metal cannot be confirmed.

[36] As Harley (2004, p. 265) emphasizes, this text served as the basis for a later article by the composer called "Determinacy and indeterminacy" (Xenakis, 1996).

No evidence of Xenakis being in communication with this group was found; although the concert was filmed (as can be observed in Fig. 9.15a), it does not seem that the composer received any recorded material. The group played the piece again on other occasions, including two times at the German festival Interventionen (1984 and 1985), but it does not seem that new repertoire was developed with the instrument.

### 9.2.6 Makoto Aruga Percussion Ensemble (Japan, 1984)

This group was established in Tokyo and was fundamental to developing a significant portion of the Japanese repertoire for percussion ensemble. They worked with several composers to premiere new commissions and recorded at least four CDs; in 1986, they were even the first group to release a recording of *Pléïades* (Fig. 9.16). These musicians were recording and producing their album while Hébrard and Abitbol were still working to build the new model for Les Percussions de Strasbourg (with which they wanted to do their first recording, but that was not released until 1987). The Japanese group recorded on July 23 and 24, 1985, and released their album the following year.

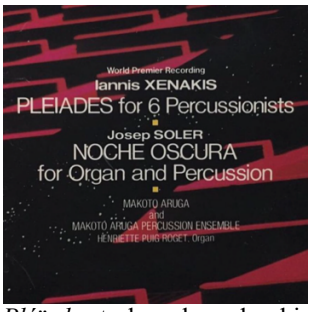



***Figure 9.16***. Cover of the first album with *Pléïades* to be released, which was recorded by Makoto Aruga Percussion Ensemble in 1985 and released in 1986.

The first contact with the composer was made through Yuji Takahashi[37] (1938) in a letter sent on October 25, 1983. Takahashi wrote:

> Dear Iannis,
> A group of percussionists in Tokyo is going to perform PLEIADES on 17 Jan 1984.
> They are trying to build SIX-XEN from steel pipes.
> Is there a tape of the performance by Strasbourg people, could you send a copy to them? (Yuji Takahashi, mail to Iannis Xenakis, October 25, 1983).

Then, he also referred to the group's leader, providing Xenakis with the address of Makoto Aruga. In the same letter, the composer wrote "OK cassette return" with the indication of a date ("Ok renvoi cassette 2.12.83"). Thus, the date could be related to when he sent a recording of *Pléïades* by Les Percussions de Strasbourg, or maybe he received a recording of the Sixxen of the Japanese ensemble and then he returned the material on December 2, 1983 (if it is the case, this letter was not

[37] Yuji Takahashi was a great friend of Xenakis; he premiered *Herma* (1960–61) and *Eonta* (1963–64) and was one of the main interpreters of his piano works. He was also his student in Bloomington in the beginning of the 1970s.

found). Due to the dates, the ensemble probably sent Xenakis references for their Sixxen due to the concert's proximity in January. It would be very complicated to start the experiments and construction in such little time. After that, the composer received a recording of the concert, which took place on January 17, 1984, at the Ishibashi Memorial Hall (Tokyo) and was the first concert in which the group played the piece, as indicated by Takahashi (archived in the BnF as DONAUD 0604 1016—Xenakis 1072). He also received a cassette recording of the group titled "PLEIADES CD Japon Aruga... 1986" with the timing of each movement and indications of the musicians: Makoto Aruga, Shiniti Ueno[38], Takaya Nakatani, Toshiyaki Matsukura, Takashi Fukuda, and Takako Yamaguchi. This cassette (DONAUD 0604 1017—Xenakis 1073) could then be a copy of the master CD released in 1986.

Shiniti Ueno and Takaya Nakatani were contacted to find more information about the development of this project. Their exchanges with the composer were limited to distanced correspondence because, even though Xenakis went to Japan many times, they did not have a personal meeting. According to Nakatani, the composer did not participate in the group's rehearsals or the recording of the album.

The prototype with the round steel pipes used by the group was constructed by Shigeru Uetake from Tokyo College of Music at the request of Aruga (who was a professor at the Tokyo Music University). In the group's program for February 1986, Shigeru Uetake affirmed: "As the composer said, this is not a complete instrument. In the future it seems that there is still some space for modifications." Xenakis was constantly going to Japan, but it seems that neither the constructor of this Japanese prototype nor the musicians who performed and recorded it established more than those initial contacts.

### 9.2.7 Les Pléiades and Sylvio Gualda (France, 1984)

A second French percussion group constructed a Sixxen in the first half of the 1980s; again, they had strong ties with Xenakis, and he directly participated in the development process. The group was founded by Sylvio Gualda (1939), with predominantly his students as performers. Initially, it was a possibility to practice chamber percussion music for them, but it turned into a fixed sextet called Les Pléiades, with the primary objective of performing Xenakis' pieces for percussion ensemble and creating memorable recordings. There are few references and little information gathered about the group heretofore. However, because it involved members of the inner circle of the composer's contacts and they developed his own Sixxen (in two different versions), some of the group's historical background will be presented here. The most important printed materials about it were found in the

[38] Shiniti Ueno went to France in the second half of the 1970s to continue his studies in percussion with Jean Batigne, Sylvio Gualda, and Jean-Pierre Drouet, and he stayed until at least the middle of the 1980s. He participated in many events organized by those musicians; it seems clear that he was familiar with their chamber repertoire, and he returned to Japan with all of those influences, probably including *Pléïades*.

*Collection Famille Iannis Xenakis*. They were complemented by interviews with Gualda and Eve Payeur (one of the main ensemble members in its multiple configurations currently responsible for storing their last Sixxen). Payeur (interview by author, 2019) stated about the group that:

> the first concert, in my professional opinion, was in 1985-86, but we had been playing together for at least three years. And Sylvio Gualda decided to create a female group because he had a lot of female students in his conservatory, and I think that's what gave him the idea to make this group, and then it was, in my opinion, to play the work of Xenakis, *Pléïades*. [...] it was his life, Xenakis was the life of Sylvio Gualda. Afterwards, in relation to his desire to make this group, he had a whole network in which, for the music of Xenakis, there were requests. So, we were able to play in many places because he had already with Xenakis this address book. That opened many doors for us...[39]

The present research found more steps in Gualda's career that could be considered previous stages of the development of the ensemble, at least in the preparation of a group that could assume the performance of Xenakis' pieces. Then, the oldest document showing that one of Xenakis' pieces for percussion ensemble was organized by Gualda refers to the performance of *Persephassa* during the *Mycenae Polytope* (1978). Sylvio Gualda presented *Psappha* and *Persephassa* during the event (September 2 to 5, 1978). His students were particularly noted in the press due to the impact of their performance[40]. This group was called the "French Percussion Ensemble" specifically for this occasion, as it is verifiable in the program notes of the spectacle (Fig. 9.17).

**a)**


**b)**

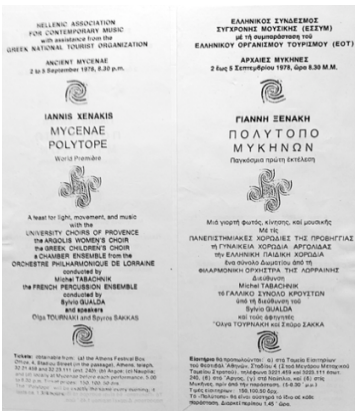



***Figure 9.17***. Program notes of the spectacle *Mycenae Polytope* (1978) with the participation of Sylvio Gualda and his students called French Percussion Ensemble. **a)** Cover of the program. **b)** Flyer of the event announcing the percussion ensemble. Source of both: © Famille I Xenakis DR.

[39] "Donc le premier concert à mon avis professionnel c'était en 85-6, mais on jouait ensemble depuis au moins 3 ans. Et Sylvio Gualda a décidé de créer un groupe féminin, parce qu'il a eu énormément d'élèves filles dans son conservatoire, et je pense que c'est ça qui lui a donné l'idée de faire ce groupe, et ensuite c'était à mon avis pour jouer l'œuvre de Xenakis, les Pléiades. C'est pour ça le nom du groupe, [...] ça a été sa vie, Xenakis ça a été la vie de Sylvio Gualda. Après, par rapport à son désir de faire ce groupe, il avait tout un réseau dans lequel pour la musique de Xenakis y'avait des demandes. Donc on a pu jouer à beaucoup d'endroits, parce qu'il avait déjà avec Xenakis ce carnet d'adresses. Ça nous a ouvert beaucoup de portes..." (Payeur, interview by author, 2019).

[40] "*Psappha* and *Persephassa* with Sylvio Gualda and his students were some of the highlights of the evening, and were set as almost climactic elements of the whole spectacle." As originally stated: "Psappha et Persephassa avec Sylvio Gualda et ses élèves est un des destaques de la soirée – mis comme éléments presque apogétiques de tout le spectacle." (Lacouture, 1978).

After the end of the 1970s, a concert called "*Hommage à Iannis Xenakis – Persephassa*" occurred on April 17, 1982, at the *Auditorium Claude Delvincourt* of the Versailles Conservatoire (called in French *Conservatoire à Rayonnement Régional de Versailles Grand Parc*), where Gualda had responsible for the percussion classes since 1971. In the program, among many pieces that were initially for percussion or arrangements, six students played *Persephassa* once again[41]. In the program, it is also perceptible that many future members of Les Pléiades (Christine Lagniel, Claire Talibard, Dominique Mathis, Eve Payeur, Stéphanie Herbert, and Sylvie Dukaez) participated in the concert by playing other pieces.

It is important to remember that a previous mention of Gualda's research on the Sixxen was made by Xenakis when communicating with Ruud Wiener in October of 1982. Thus, maybe Gualda was already very active and trying to achieve a Sixxen that could please the composer since this year. However, the oldest program showing that Gualda's students presented *Pléïades* was that of a concert on November 23, 1984, at the Percussion Forum[42]. On this day, a lecture about *Pléïades* was given by Gualda, and a concert was performed by the *Ensemble de percussion du Conservatoire de Versailles*. The group also played *Persephassa* in the same festival on November 26. Thenceforth, with a Sixxen available, Gualda always organized concerts that eminently presented the instrument and focused on Xenakis' works. Thus, this new group that was very active in diffusing Xenakis' music and consisting mainly of Gualda's students emerged in Paris; even though some of the musicians were constantly changing, they were always in his inner circle of students.

Gualda brought this Sixxen to the *Centre Acanthes*[43] (Fig. 9.18a) in 1985 because the guest composer was Xenakis. This event, which occurred in Aix-en-Provence (France), Salzburg (Austria), and Delphi (Greece) from July 5 to August 17, 1985, was entirely dedicated to Xenakis' pieces, who was present in classes, lectures, and rehearsals. Then, a group of percussion students started to excel and, under the designation of *Ensemble de Percussion du Centre Acanthes*, they presented *Pléïades* in all three countries.

[41] Jean-Pierre Bédoyan was one of the students who played *Persephassa* in that concert, and he later become one of the musicians of Les Percussions de Strasbourg, recording *Pléïades* in the albums of the ensemble.

[42] The Percussion Forum (originally called in French *Forum des Percussions*) occurred from November 14, 1984 until January 7, 1985 as result of a collaboration between the *Centre Georges Pompidou* and the *Centre Acanthes*. It was launched at the initiative of Jean Maheu (president of the *Centre Georges Pompidou*) and Pierre Boulez as an immense festival dedicated to percussion from all over the world and with almost one hundred events, concerts, and lectures. There was a specific series of events dedicated to Kagel, Stockhausen, Reich, and Xenakis, with the presence of the last two. It also had contributions from Sylvio Gualda, Daniel Humair, Paul Méfano, Christian Moussé, Henry Pillsbury, and Nicholas Snowmann in the artistic concepts and development.

[43] The *Centre Acanthes* was founded in 1977 by Claude Samuel as a pedagogical structure to allow young musicians (composers or instrumentalists) to share their daily life for weeks with the greatest composers of the moment. He changed several times his residence places: Aix-en-Provence (1977-1986), the Chartreuse de Villeneuve-Lès-Avignon (1987-2003), Metz (2004-2011). From 2012 it was incorporated in Ircam and because of that organized in Paris. Sylvio Gualda was teaching percussion at the *Centre Acanthes* in several editions since 1978.

a) b) c)

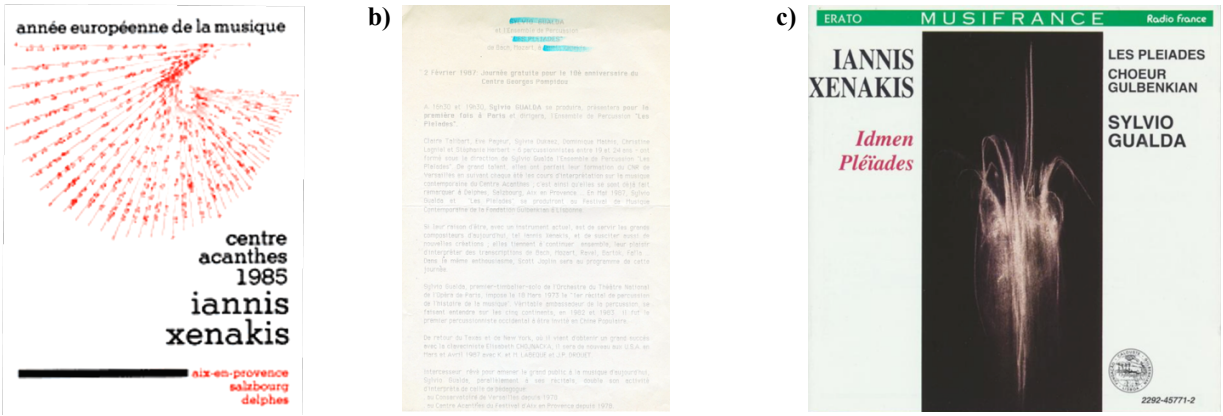



***Figure 9.18.*** Documents connected to the background of the establishment of the ensemble Les Pléiades. **a)** Poster of the Acanthes Center 1985. **b)** Program notes indicating for the first time the name Les Pléiades during the *Centre Georges Pompidou* 10th anniversary. **c)** First recording of Les Pléiades. Source of all: © Famille I Xenakis DR.

The last concert of this group during the event was on August 9, 1985, when they played in the memorable ancient stadium of Delphi. The musicians on this occasion were Eve Payeur, Christine Lagniel, Sylvie Dukaez, Claire Talibart, Dominique Mathis, and Thimothy Kotowich. These events at the *Centre Acanthes* were fundamental and decisive for the final establishment of the professional ensemble called Les Pléiades. Gualda (1991, p. 154) expressed in an interview:

> These students from the Conservatoire de Versailles were, at the time, about sixteen years old. One day, they asked me if they weren't too young to go to the *Centre Acanthes*. And I thought that, even if they didn't have sufficient technique since they asked for it, they should come. At that time, I had a majority of female students and, by unbelievable luck, a good ten of very high level [...] I encouraged them, and this group was born spontaneously at the *Centre Acanthes*.[44]

After that, a concert in 1987, and the recording of two of Xenakis' pieces at the beginning of the 1990s, the group was consolidated to six female percussionists. As Ewe Payeur (interview by author, 2019) stated:

> In fact, it started because the Acanthes Center, which was absolutely extraordinary, had done a Xenakis year in which we performed *Pléïades*. I didn't even know how to play with four mallets, I learned to play with four mallets on C, G, A C at the end of «*Claviers*». We didn't have the level yet, but he [Sylvio Gualda] introduced us to it. [...] It was crazy. And we got grants, we went with Xenakis, and we did six weeks of concerts in Delphi, we went to Salzburg. It was incredible.[45]

Thus, the first time that Gualda used the designation Les Pléiades (*Ensemble de Percussion Les Pléiades*) and introduced them as a fixed group was in a concert on February 2, 1987, at the

[44] "Ces étudiantes du Conservatoire de Versailles avaient, à l'époque, à peu près seize ans. Un jour, elles m'ont demandé si elles n'étaient pas trop jeunes pour aller au *Centre Acanthes*. Et j'ai pensé que, même si elles n'avaient pas une technique suffisante, puisqu'elles le demandaient, il fallait qu'elles viennent. A cette époque, j'avais une majorité d'élèves féminines et, par chance inouïe, une bonne dizaine de très haut niveau [...] Je les ai encouragées et ce groupe est né spontanément au *Centre Acanthes*." (Gualda, 1991, p. 154).

[45] "en fait ça a commencé parce que le *Centre Acanthes*, qui était absolument extraordinaire, avait fait une année Xenakis dans laquelle on a monté *Pléïades*. Moi je ne savais même pas jouer à quatre baguettes, j'ai appris à jouer à quatre baguettes sur C, G, A C sur la fin de Claviers. On n'avait pas encore le niveau en fait, mais il [Sylvio Gualda] nous a lancées là-dedans. [...] C'était dingue. Et on a eu des bourses, on est partis avec Xenakis et on a fait 6 semaines de concerts à Delphes, on est allés à Salzbourg, c'était incroyable." (Payeur, interview by author, 2019).

celebrations of the 10th anniversary of the *Centre Georges Pompidou* (Fig. 9.18b). Even though they only presented some of the movements of *Pléïades*, the group's name was established until its end. It seems that Xenakis himself even attributed it. As Gualda (1991, p. 154) affirmed, "[It was] Xenakis who, I believe, liked them very much and proposed to call them 'Les Pléïades'."[46] This may have occurred between the activities at the *Centre Acanthes* in 1985 and this first official concert in 1987.

Eve Payeur, Christine Lagniel, Sylvie Dukaez, Claire Talibart, Dominique Mathis, and Stéphanie Herbert were the first official members of the ensemble on this occasion (later, Hélène Colombi and Marianne Delafon also joined it on different occasions). It is perceptible that these were quite the same musicians that participated in the *Ensemble de Percussion du Centre Acanthes* in 1985, showing the connections between the group, the *Conservatoire de Versailles*, and the *Centre Acanthes*, all through the direction of Gualda. Over the following years, the group continued to present Xenakis' ensemble pieces, and other composers' music became part of their repertoire as well. Because of Gualda's contacts, his friendship with Xenakis, and the high quality of the performing musicians, they participated in numerous projects carried out by the composer, such as *Taurhiphanie,* in 1988. The group released its first album, which contained Xenakis' pieces exclusively, in 1992[47] (Fig. 9.18c). *Idmen A B* was recorded in July 1990, and *Pléïades* in September and December 1991. They also sent a recording to the composer (probably the master copy), but it did not include *Pléïades*, only *Idmen A B* (archived as DONAUD 0602 687—Xenakis 734 in the BnF).

The ensemble developed two prototypes. It is not very clear when they changed their instruments, but Eve Payeur stated that they passed to a new Sixxen when recording the album in 1991, and the photos of the instrument used in *Taurhiphanie* could show that the group was still using the first prototype until, at least, 1988 (Fig. 9.19a). These photos show that the first prototype had aluminum bars with inverted-U profiles, presented in a horizontal disposition with a continuous layout of the keyboard (Fig. 9.19b). It is thus certainly the same instrument used at the *Forum des Percussions* in 1984 and the *Centre Acanthes* in 1985. Materials referring to it prove Gualda and Xenakis were working on completing this Sixxen from the first half of 1982. As Xenakis wrote to Ruud Wiener in a letter in 1982, Gualda would send him some construction details of the Sixxen they were designing together and working with a constructor[48]. The prototype was completed in 1984 (because it was used in the concert at the Percussion Forum) and the constructor responsible was

[46] "[c'est] Xenakis qui, je crois, les aime beaucoup et leur a proposé de les appeler 'Les Pléïades'." (Gualda, 1991, p. 154).
[47] Les Pléiades recorded other albums after that. In 1995, they recorded *Archipel III* (1969) by André Boucourechliev (1925–1997) with the pianist Claude Helffer (1922–2004).
[48] As previously stated: "Sylvio Gualda will [...] send you more construction details of the SIXXEN which is the name for this metallic instrument. We have studied with a constructor this Sixxen lately and it looks more or less satisfactory, but there is no objection that you try again in order to obtain much better results." (Iannis Xenakis, mail to Ruud Wiener, October 29, 1982).

probably Gilbert Fergeau–at the time responsible at Bergerault, a French company of percussion instruments. The same company would also work on the second prototype (Fig. 9.19c and d), an improved version with pedal and resonators.

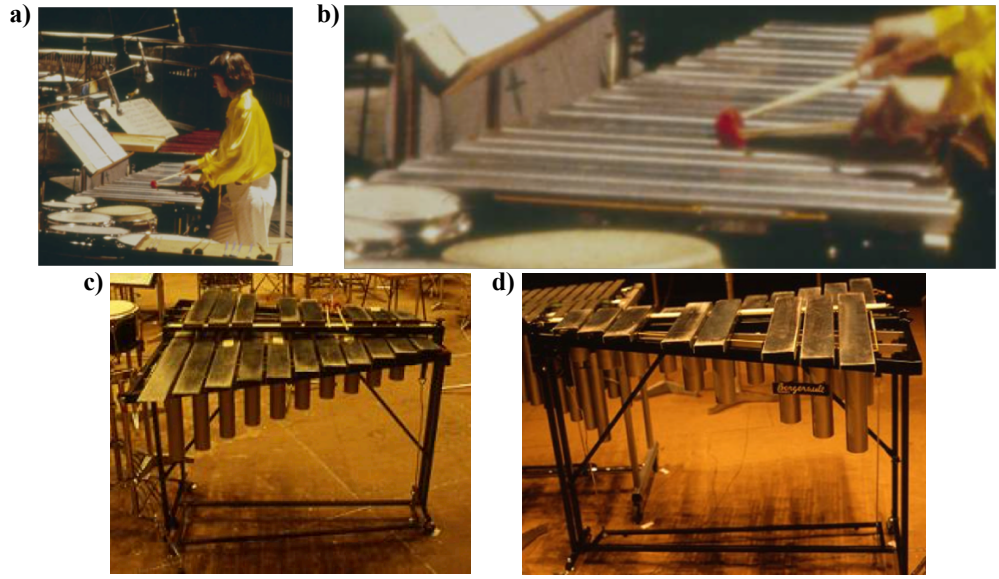



***Figure 9.19***. First (**a** and **b**) and second Sixxen (**c** and **d**) used by the ensemble Les Pléiades (France). **a)** Musician of the Les Pléiades performing during the spectacle *Taurhiphanie* (1987). **b)** Detail of the previous photo showing the first prototype. Source of both: © Famille I Xenakis DR. **c)** Second Sixxen of Les Pléiades, rear view. **d)** Second Sixxen of Les Pléiades, front view. Source of both: www.bergerault.com/fr – © Bergerault.

As Payeur (interview by author, 2019) stated:

> So, in fact, the first sixxens were even worse than the second because there was never any money. Gualda worked alone, he was unable to find subsidies, Xenakis didn't take care of it, the Percussions de Strasbourg didn't lend their material, so the first sixxen we had had 19 bars one after the other, without pedal, and the score was 19 notes like that. [...] We spent, to try to play more or less what he had written, I don't know how many hours. And then we said to Sylvio, "but we absolutely have to have a real keyboard," and we got it for the recording only, I think because we even played with the Percussions de Strasbourg in the South for the *Thaurhiphanie* there. I think we still had the old sixxen. They were not good. And then I think it was Bergerault who rebuilt them for the recording, but again there was no money, so Gualda said, "listen, I'll buy you some material, do this for us," but there was no money.
> He always worked with Bergerault, we always bought Bergerault's material, and they did it for us. They also made the C, G, A, C boxes. Finally, we got the boxes to have resonant and not resonant for the notes because otherwise we couldn't, and so here we are, and when Xenakis showed us what he wanted as bars for the sixxen, it was steel, it was railway rails. It was impossible.[49]

[49] "Alors en fait, les premiers sixxens étaient encore pire que les seconds, parce qu'il n'y a jamais eu d'argent. Gualda il travaillait seul, il était incapable de trouver des subventions, Xenakis ne s'en occupait pas, les Percussions de Strasbourg ne prêtaient pas leur matériel, donc les premiers sixxen on a eu 19 lames les unes à côté des autres, sans pédale, et la partition c'était 19 notes comme ça. [...] On a passé, pour essayer de jouer à peu près ce qu'il avait écrit, je ne sais pas combien d'heures. Et après on a dit à Sylvio « mais il faut absolument qu'on ait un vrai clavier » et on l'a eu pour l'enregistrement seulement je crois, parce que même on a joué avec les Percussions de Strasbourg dans le Sud pour la *Thaurhiphanie* là. Je crois qu'on avait encore les anciens sixxen. Ils n'étaient pas bons hein. Et donc après je crois que c'est Bergerault qui nous en a reconstruits pour l'enregistrement, mais de nouveau il n'y avait pas d'argent, donc Gualda il disait « écoutez je vous achète du matériel, faites nous ça », mais y'avait pas d'argent.
Il a toujours travaillé avec Bergerault, on achetait toujours le matériel de Bergerault et eux ils ont fait ça pour nous. Ils ont aussi fait les boîtes de Do, Sol, La, Do. Finalement on a eu les boites, pour avoir résonant et non résonant, pour les notes, parce qu'autrement on ne pouvait pas, et donc voilà et quand Xenakis nous a montré ce qu'il voulait comme lames

This second Sixxen had the same bar characteristics as the first: aluminum bars with an inverted-U profile, but the frame changed considerably, presenting a horizontal disposition in two heights and with a discontinuous layout of the keyboard (in a disposition with some equivalence with other percussion keyboard dispositions, as claimed by the musicians). This prototype also presented a pedal mechanism for dampening (Fig. 9.20a) and a double system of resonators (Fig. 9.20b and c).

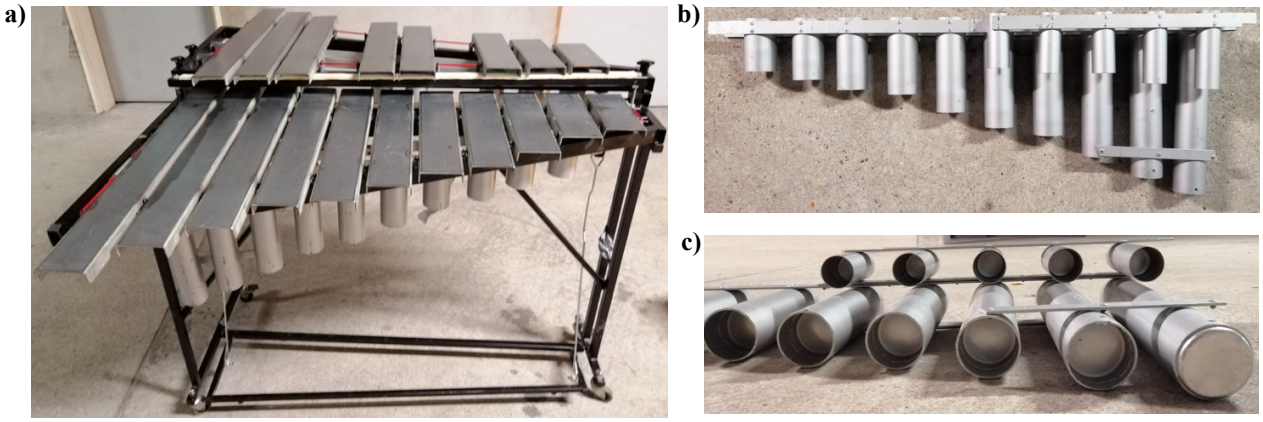



***Figure 9.20***. Characteristics of the second prototype of Sixxen developed for the ensemble Les Pléiades: Pedal mechanism for dampening (**a**), resonators with a double range of tubes in the lower notes: front view (**b**), bottom view (**c**). Source of all: Photo by the author.

The group, its performative strength, and its recordings tremendously influenced the diffusion of Xenakis' repertoire for percussion. This group's ties with the composer and Sylvio Gualda's importance were so strong that, for many, they represented a reference in the sonority of the SIX-XEN. As a famous and sought-after teacher, Gualda also influenced many percussionists who would later produce models of the Sixxen, thus changing many perspectives of the instrument's artistic research.

### 9.2.8 Kroumata Percussion Ensemble (Sweden, 1989)

Kroumata was founded by Ingvar Hallgren, Anders Holdar, Jan Hellgren, and Martin Steisner in Stockholm in 1978. As a result of the meeting of the percussionists during their military service in Sweden, they organized a group to perform specific chamber repertoire. Although its members changed over time, the group worked continuously until 2015, becoming an acclaimed percussion ensemble of the 1990s and 2000s. Many composers wrote for the group, including Iannis Xenakis, Sofia Gubaidulina, and Sven-David Sandström, among many others. In 2015, the Stockholm University College of Music Education acquired Kroumata's instrument collection and became responsible for its administration, and in 2019, the Kroumata Percussion Center was created to make all of those instruments available through festivals, classes, concerts, and workshops.

pour les sixxen, c'était de l'acier, c'était des rails de chemin de fer. C'était impossible." (Payeur, interview by author, 2019).

In an exchange with Anders Holdar, some details of their research to perform *Pléïades* appeared. It seems that they initially rented the Kolberg prototype from Les Percussions de Strasbourg, but later, they purchased a new instrument made by Robert Hébrard and Albert Abitbol. As he stated:

> We made our first performance of the piece in Sweden on the first set of sixxen built for Les Percussions de Strasbourg. We rented it from them.
> At that point, they had got their second set from Grimus, a better up model. After our first performance, we decided to buy a new setup from Grimus. Probably the third set-up made by the firm.
> This is the way I remember the story, but I'm not 100% sure. It might have been so that we ordered our set even from start and made our first performance on our own set-up, but the idea of that we first rented before being our own seems more reasonable. (Anders Holdar, email to author, November 24, 2020).

He was not sure about the dates of their first performances of *Pléïades*, but a reference tied to it was found among Xenakis' recordings (BnF). The group sent the composer a cassette (DONAUD 0604 1018—Xenakis 1074) mentioning a concert in Berwald Hall in Stockholm on February 3, 1989. Holdar also mentioned something interesting about the changes that they made to the score:

> Around that era one of our members, Anders Loguin, played in an internationally composed percussion group for a performance of the piece in Queen Elizabeth Hall in London. It must also have been one of the first years of the 90s. And after our discussions in the group, he asked Xenakis if he could think of rewriting the sixxen movement to a simple G-clef score where the tones were marked at the place of the bar on the instrument no matter what pitch it had instead of the difficult notation he had chosen with four or five different clefs following the very pitch of the bar. We got a new score in less than two weeks from the publisher and could read and play it properly at once! (Anders Holdar, email to author, November 24, 2020).

The group released their record of the piece in 1990 (Fig. 9.21a) with Grammofon AB BIS (Sweden), and the musicians were Ingvar Hallgren, Jan Hellgren, Anders Holdar, Leif Karlsson, Johan Silvmark, and Anders Åstrand. Conducted by Anders Loguin, they recorded on May 19 and 20, 1990, in the gymnasium of Danderyd Grammar School (Stockholm).

**a)** **b)**

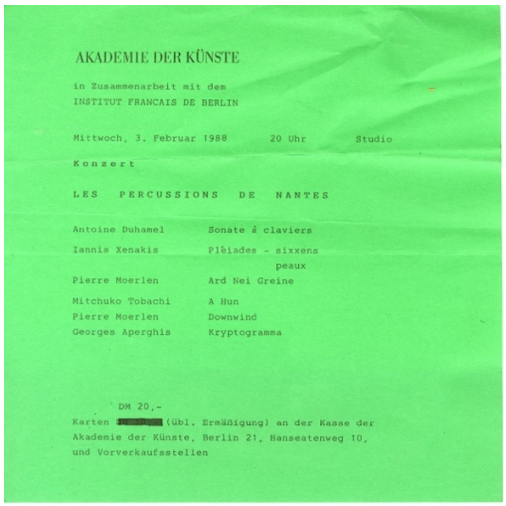

***Figure 9.21.*** Kroumata Percussion Ensemble and the performancing of *Pléïades*. **a)** Cover of the album launched with the piece. Source: © Grammofon AB BIS (Sweden). **b)** Photo of the Hébrard-Abitbol model developed for the ensemble. Source: https://www.instagram.com/p/Bn5rlsthh1w/.

As the previous Hébrard-Abitbol model, the Sixxen used by the ensemble was made with duraluminium bars and an inverted-U profile, and a pedal but was without resonators. The difference from the Sixxen produced for Les Percussions de Strasbourg (with gray and black bars) was that this one had its bars in a golden and black finish (Fig. 9.21b). Because the group opted to purchase this model directly, they did not exchange with Xenakis about the construction of Sixxen. However, they asked the composer to dedicate a new piece to them during that period. As Lundberg (1995, p. 30) stated, "Xenakis has promised them a new work for percussion and trombone after being impressed by their interpretation of his *Pleiades*." This was thus the way *Zythos* (1996) was commissioned, being created by the group on April 6, 1997, with Christian Lindberg as trombone soloist.

As Leif Karlsson, an ensemble member, stated during an interview: "one work, '*Pléiades*' by Xenakis, is an influential piece for our ensemble. We played it for the first time about ten years ago, and it has been very successful for us and important for the ensemble's dynamic and way of thinking." (Weiss, 1999, p. 8). Thus, the piece was an important element for the group and the album that this ensemble recorded and the concerts they performed were certainly very influential in the "way of thinking" of many young percussionists.

### 9.2.9 Groups that rented a Sixxen in the 1980s

Percussion ensembles that did not construct their Sixxen prototypes started to rent it in the 1980s. After receiving the new Hébrard-Abitbol model, Les Percussions de Strasbourg started to rent out their second version of the Sixxen made by Kolberg. This seems to have occurred sometimes, as was the case with the ensemble Les Percussions de Nantes in 1988 (Fig. 9.22). In the case of this particular ensemble, the contact was made because Gérard Hiéronimus, director of the ensemble, studied with Jean Batigne. A potential source of contact with the group and certainly with this kind of repertoire.



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Mittwoch, 3. Februar 1988 20 Uhr Studio

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LES PERCUSSIONS DE NANTES

| | |
|---|---|
| Antoine Duhamel | Sonate à claviers |
| Iannis Xenakis | Plêiades - sixxens peaux |
| Pierre Moerlen | Ard Nei Greine |
| Mitchuko Tobachi | A Hun |
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| Georges Aperghis | Kryptogramma |

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***Figure 9.22***. Program notes of the ensemble Les Percussions de Nantes presenting «*Métaux*» and «*Peaux*» during a concert in 1988. Source: © Famille I Xenakis DR.

Sylvio Gualda did the same, giving access to the prototype he developed with Bergerault. Thus, the Percussion 1988 Festival in England rented his prototype. As stated by James Wood (email to author, April 17, 2020):

> I knew Xenakis quite well, and I know that he was very unhappy with the very first sixxens that Percussions de Strasbourg made, but their second version was better. I'm not even sure I saw this second version, but then there started to appear instruments made from aluminum U-section, which are fantastic, and I think Xenakis liked them very much too, but I can't swear to that. These were the ones we hired (I think) from Bergerault for the Percussion 88 Festival, and then Percussive Rotterdam made a similar set themselves.

The interest and the diversification of prototypes received a critical increment in the 1990s, as will be now highlighted.

### 9.2.10 The diversification of initiatives in the 1990s

In the 1990s, numerous projects to present *Pléïades* in different countries were also developed. As in the decade before, some constructed new Sixxen prototypes, and others rented them. Here, these groups will only be pointed out as a way to mention the diverse perspectives that the decade produced in terms of percussion groups and their interest in the Xenakian instrument, but no specific and detailed description will be addressed because many of those instruments will be represented by images in Chapter 10.

During the Musikprotokoll[50] of 1990, a concert in which *Pléïades* was presented took place on October 4. This was a percussion project by Robyn Schulkowsky (USA) with Studio Percussion (Germany), a group directed by Günter Meinhart. Schulkowsky (interview by author, 2021) stated:

> So, the deal with the festival was I bring three people, and the festival brings three people, and because it was in Graz at the time, they were trying to get local people more involved in contemporary music. Because in the nineties, at that point… like now Klangforum goes to Graz every year and teaches contemporary music, but at that time, twenty years, thirty years ago, that was not… there was nobody in this actual town. [...] the director at the time, he did a fantastic job in that he filled up the concert halls. Didn't matter who was playing, and it didn't matter which time of day, he got [...] Grazians to go out and listen to new music. And maybe part of it was that you had to work with people from the community, that might have been…

In some exchanges with Günter Meinhart (email to author, January 21, 2021), he stated that "the Sixxen we used for this performance have been rented by the Festival Musikprotokoll from Les Percussions de Strasbourg." In the end, either this group or the festival sent a tape recorded by Studio Steiermark to Xenakis, and it was later incorporated into his audio archives in the BnF (DONAUD 0604 398—Xenakis 412).

Nova Ensemble (Australia) was created in 1983 by David Pye as a percussion quartet. Since then, it became a group with variable formations that could incorporate non-percussive instruments

[50] Musikprotokoll was created by Emil Breisach in 1968 and has existed since then. It was conceived as a festival for contemporary and experimental music, and is annually organized by the ORF (Austrian Broadcasting).

and electronics to perform a diverse contemporary repertoire. As Devenish (2015, p. 105) stated, "Instrument building was another major part of Nova Ensemble's practice in the 1980s and 1990s. The accessibility, or inaccessibility, of Australian percussionists to vast instrument collections, has significantly impacted the work produced by ensembles." They created their Sixxen in the first half of the 1990s and performed *Pléïades* in 1992 (Australian premiere at WA Conservatorium of Music Auditorium November 29, performed by Tim White, David Pye, Amanda Dean, Paul Tanner, Neil Craig, Alison Eddington). They recorded *Junkelan*, a piece that included sixxens, in 1993 due to their research on new instruments[51]. As Tanner (email to author, May 13, 2022) stated, "I think the Nova performance of Pleiades (for which we built the stop-sign Sixxens) was around 1991-92?" He also specified a little about this prototype, saying, "The Nova instruments used even heavier metal –they were also called 'stop-sign-a-phones.' I think they were literally recycled from stop signs! So yes – very loud! Very different to the beautiful aluminum ones available today." (Tanner, email to author, May 12, 2022).

Percussive Rotterdam (Netherlands) was founded as a trio in 1991 by Hans Leenders, Norman van Dartel, and Wilber Grootenboer. Afterward, the group quickly turned into an ensemble with variable formations (quartet, sextet, and others) on a project-by-project basis and included musicians such as Chris Leenders, Gerrit Nulens, Miquel Bernat, Mike Schaperclaus, and Robert Van Sice. In an exchange with James Wood (email to author, April 17, 2020), he mentioned that the group produced a Sixxen based on the specifics of the Bergerault prototype made for Sylvio Gualda and Les Pléiades (inverted-U aluminum). The first mention of their *Pléïades* presentation is in a New York Times article about their 1993 tour of the USA, in which they presented this piece and others (Fruchter, 1993, p. 17).

*Pléïades* was presented in Darmstadt (Germany) two times (1984 and 1994) under the artistic direction of James Wood (who was responsible in many editions for teaching percussion from 1982). The first time was in a concert on July 26, 1984, with Martin Allen, Károly Bajtos, Zoltán Racz, Zsolt Sárkány, Steven Schick, and Zoltan Váczi as the musicians and Wood as the conductor. That year, they played only «*Claviers*» and «*Peaux*». On July 8, 1994, the piece would again not be presented in its entirety; this time, only «*Métaux*» was performed by Kirk Brundage, Kuniko Kato, Slavik Stachov, Yuko Suzuki, Vanessa Tomlinson, and Steve Wassmansdorf, again with Wood conducting. However, for this year, Wood also organized, among many other pieces, the complete cycle *Le livre des claviers* (1987–1988), which requires a Sixxen by Phillippe Manoury. Alongside the musicians already mentioned, the concert included Tatiana Koleva, Eduardo Leandro, and Pascal Pons. It seems that the Sixxen used in 1994 was the one that Percussive Rotterdam developed, and some details can

[51] For more details about this group and the Australian percussion environment, see Devenish (2015) and Devenish (2019).

be found in Hockings (1994, p. 28).

Brake Drum Percussion (Italy) was founded in 1983 as a trio and grew into a sextet in 1988. After that, they constructed their Sixxen in the first half of the 1990s, mainly with the Italian cymbal company UFIP. This ensemble, under the artistic direction of Pietro Bertelli, contacted Xenakis to have more information about the construction of a Sixxen. Until 1991, many phone calls were organized in order to fit the composer's expectations, as Bertelli himself stated (interview by author, 2022). The exchanges occurred mainly with Radu Stan (who was Xenakis' representative with the Salabert publishing house), but it is certain that everything was under the approval of Xenakis. In 1995, they released a CD with *Pléïades,* and the musicians of the group in that recording were Renato Adizzoni, Pietro Bertelli, Andrea Berto, Gianni Casagrande, Nicola Ghedin, and Andrea Mascherin. This recording was present in the personal collection of Xenakis, and it could have pleased the composer because it seems that, through Radu Stan again, the ensemble was invited to perform in different events as described by Pietro Bertelli (interview by author, 2022).

Created in 1977, Slagwerk den Haag (Netherlands) is a percussion group that at least three generations of musicians have since represented. It seems that they also constructed their Sixxen in the first half of the 1990s. They worked with Peter Adriaansz on a new piece with Sixxen, *Music of Mercy pt.3* (1996–1997), and released a recording of it in 2002. The recording was made by Marcel Andriessen, Martin Ansink, Tom van der Loo, Emiel Matthijsse, Feudor Teunisse, and Fredrike de Winter, with Jonathan Stockhammer as conductor. The ensemble sent recordings of *Pléïades* and *Okho* to Xenakis, but without a date or additional information (the material is archived as DONAUD 0604 894—Xenakis 947 in the BnF).

Red Fish Blue Fish was founded by Steven Schick, and they developed their Sixxen in the second half of the 1990s. In 1998, they premiered and recorded *Interregna* by Mark Osborn—a piece that requires a Sixxen—and released the CD in the same year. Brett Reed, a then doctoral student of Schick at the University of California San Diego (UCSD), published one of the most influential articles on the SIX-XEN, in which he described the model developed for Red Fish Blue Fish (Reed, 2003). They also released *Pléïades* in 2006, and an almost complete recording of Xenakis' works for percussion[52].

The prototypes from the 2000s, 2010s, and 2020s not mentioned here are presented and better described in Chapter 10. The present chapter addressed a more historical overview of the percussion ensembles that created their Sixxen. The limit of decades here established was also based on the Sixxens created during the period of life of Xenakis, also showing the musicians with whom he would

[52] See more details in Chapter 11–Subchapter 11.3.

have potentially exchanged about. It will now be described in the ensembles that Xenakis certainly had some contacts, or at least demonstrably listened to their Sixxens.

## 9.3 Recordings of different groups that Xenakis had access to

As mentioned, many previous groups sent tapes to Xenakis with their versions of *Pléïades* and sounds of their Sixxens. This seems fundamental to be mentioned here because it indicates that the composer was generally very aware of what was being produced as a result of his description about the SIX-XEN. Some ensembles maintained even longer correspondences with the composer, sending different recordings, program notes, adding letters, images, or more specifics about their own prototype, generally trying to inform the composer that they created his piece in a specific country and also trying to have his attention and opinion to the sonority accomplished.

Thus, the documents related to Xenakis' personal belongings archived in the BnF indicate that the composer had at least 22 recordings of *Pléïades* made by seven different percussion groups, as shown in Table 9-1. The first recordings are from 1979, and the last from 1990; in addition, there are four records without any dates indicated. In those materials, there are eight different Sixxen prototypes included. One can also perceive how the groups organized the order of the movements of *Pléïades*; though many different orders were used, there was a tendency toward «*Mélanges*», «*Claviers*», «*Métaux*», and «*Peaux*».

There are significant materials in this collection, such as the recording of Les Percussions de Strasbourg in 1979 in Baden Baden (DONAUD 0604 527–Xenakis 550). This is the best recording of the first Sixxen developed by Kolberg with Xenakis, and it attests to this prototype's specific sonorities. Another critical recording is represented by Copenhagen Percussion Group (DONAUD 0604 359–Xenakis 372) because this is the second percussion ensemble to achieve a Sixxen and record *Pléïades*. This is a very rare recording that can hardly be found in good condition elsewhere. As this last one, the specific collection also has others, such as the Nieuwe Slagwerkgroep Amsterdam (DONAUD 0604 993–Xenakis 1048) and the percussion ensemble that performed during the Musikprotokoll Klangforum (DONAUD 0604 398–Xenakis 412). It also has the recordings of the premieres of *Pléïades* in Japan (with Makoto Aruga Percussion Ensemble, DONAUD 0604 1016–Xenakis 1072), in Sweden (with Kroumata, DONAUD 0604 1018–Xenakis 1074), and in the Netherlands (with Slagwerk den Haag, DONAUD 0604 894–Xenakis 947).

This table shows that the composer got to know several instruments through personal and direct contact or recordings that were sent to him. It shows that even in groups with whom he had no contact and that in the construction of the Sixxens he did not participate, they sent him recorded samples of their instruments, allowing him to get to know numerous prototypes.

***Table 9-1***. Recordings of *Pléïades* that were found in Iannis Xenakis' personal belongings archived in the *Bibliothèque nationale de France* (BnF).

| Year | Ensemble | Description | Movements recorded | BnF identifier |
|---|---|---|---|---|
| 1979 | Les Percussions de Strasbourg | Kolberg prototype recorded in studio conditions | M, ML | DONAUD 0604 99 – Xenakis 102 |
| 1979 | Les Percussions de Strasbourg | Kolberg prototype recorded in studio conditions | ML, C, M, P | DONAUD 0604 126 – Xenakis 129 |
| 1979 | Les Percussions de Strasbourg | Kolberg prototype recorded in studio conditions | C, P | DONAUD 0604 260 – Xenakis 266 |
| 1979 | Les Percussions de Strasbourg | Kolberg prototype recorded in studio conditions in Baden Baden | ML, C, M, P | DONAUD 0604 527 – Xenakis 550 |
| 1980 | Copenhagen Percussion Group | Concert at the Royal Danish Conservatory of Music (21/12/1980) | ML, M, P | DONAUD 0604 359 – Xenakis 372 |
| 1983 | Nieuwe Slagwerkgroep Amsterdam | **A**: Concert at the Concertgebouw (08/05/1983)<br>**B**: Recorded in studio conditions | **A**: ML, C, P, M<br>**B**: P, C, M | DONAUD 0604 993 – Xenakis 1048 |
| 1984 | Makoto Aruga | Concert at the Ishibashi Memorial Hall (17/01/84)—tape containing a letter | ML, C, M, P | DONAUD 0604 1016 – Xenakis 1072 |
| 1984 | Makoto Aruga | *Pléïades* (Tokyo, 1984), *Nekuïa* (Cologne, 1982), *Komboï* (Witten, 1984) | ML, C, M, P | DONAUD 0604 459 – Xenakis 473 |
| 1985 | Nieuwe Slagwerkgroep Amsterdam | Concert at the Concertgebouw (02/1985) | P, C, M, ML | DONAUD 0604 887 – Xenakis 940 |
| 1985 | Makoto Aruga | Recorded in studio conditions at the Ishibashi Memorial Hall (23 and 24/07/1985) | ML, C, M, P | DONAUD 0604 1017 – Xenakis 1073 |
| 1985 | Les Percussions de Strasbourg | Radio broadcast (ORTF) with live recording at Festival Musica (29/09/1985) and interview with Robert Hébrard | M – Robert Hébrard interview – P | DONAUD 0604 994 – Xenakis 1049 |
| 1985 | Les Percussions de Strasbourg | Radio broadcast (ORTF) with live recording at Festival Musica (29/09/1985) and interview with Robert Hébrard | M – Robert Hébrard interview – P | DONAUD 0604 1028 – Xenakis 1084 |
| 1986 | Les Percussions de Strasbourg | Rehearsal recorded in studio conditions (11/01/86) | ML, M, C, P | DONAUD 0604 991 – Xenakis 1046 |
| 1986 | Les Percussions de Strasbourg | Copy of the master CD (10/11/86) Recorded in studio conditions | ML, M, C | DONAUD 0604 363 – Xenakis 376 |
| 1986 | Les Percussions de Strasbourg | Copy of the master CD Recorded in studio conditions | ML, M, C, P | DONAUD 0604 992 – Xenakis 1047 |
| 1986 | Les Percussions de Strasbourg | Copy of the master CD (10/11/86) Recorded in studio conditions | P | DONAUD 0604 82 – Xenakis 85 |
| 1989 | Kroumata | Concert at Berwald Hall (03/02/1989) | ML, C, M, P | DONAUD 0604 1018 – Xenakis 1074 |
| 1990 | Musikprotokoll, Klangforum | Recorded live (04/10/90) | C, ML, M, P | DONAUD 0604 398 – Xenakis 412 |
| | Les Percussions de Strasbourg | Concert that also presented *Nuits* (1967) and the Sixxen with electronic treatment | M, C | DONAUD 0604 351 – Xenakis 360 |
| | Les Percussions de Strasbourg | Continuation of DONAUD 0604 351– Xenakis 360 | C, M, P | DONAUD 0604 351 – Xenakis 361 |
| | Slagwerk den Haag | Pieces recorded live | **A**: M, ML, C, P<br>**B**: *Okho* | DONAUD 0604 894 – Xenakis 947 |
| | | Combination of recordings of different pieces (*Metastasis*, *Pléïades*, *Jonchaies*, UPIC sounds) | P | DONAUD 0604 187 – Xenakis 192 |

**Legend:**
**A** – A Side of the record
**B** – B Side of the record
C – «*Claviers*»
M – «*Métaux*»
ML – «*Mélanges*»
P – «*Peaux*»

Xenakis became personally involved in the construction and improvement of his concept for a new acoustic instrument, having worked with various percussion ensembles and builders to do so. In

this chapter, it was made evident that he contributed directly to the prototypes of Les Percussions de Strasbourg/Kolberg (1979), Sylvio Gualda/Bergerault (1984), Les Percussions de Strasbourg/Grimus (1985), and Les Percussions de Strasbourg/Yamaha (1986). His contributions were in the testing of different metals and profiles and the choice of the final materials. The search for a new prototype continued with Yamaha until the second half of the 1980s. He always hoped that the instrument would be finished, though this did not happen. He also encouraged groups to perform *Pléïades* and produce their versions of the Sixxen (Oberlin Percussion Group and New Music Concerts). Even though he was not completely convinced by their Sixxens, he invited the groups to continue working on his piece. In addition to the six models to which he directly contributed or for which he encouraged, Xenakis became familiar with six more Sixxens through recordings (Copenhagen Percussion Ensemble—1980, Nieuwe Slagwerkgroep Amsterdam—1983, Makoto Aruga Percussion Ensemble—1984, Kroumata Percussion Ensemble—1989, Robyn Schulkowsky with Studio Percussion—1990, Slagwerk den Haag—first half of the 1990s). Xenakis then got to know twelve different versions of the SIX-XEN. He did not seem to have been entirely convinced by any, but he had certain preferences.

Only in the 1980s is it clear that, at least, nine ensembles constructed Sixxens and, another six in the 1990s. Of all eight groups directly contacting Xenakis, the contact resulted in some changes in his descriptions and expectations for the instrument. He interacted differently with each group that asked him for more information about the SIX-XEN. For some, the musicians of Les Percussions de Strasbourg were indicated as a reference, and for others, Sylvio Gualda was to be consulted. Sometimes, he offered a recording of the first Sixxen that was created for a comparison, suggesting a sort of guidance to search for the instrument's sonorities. These different *modi operandi* resulted in more diversified final products, as discussed here, being a kind of ultimate objective.

# Chapter 10. Sixxens constructed around the world

*L'originalité est une nécessité absolue de survie de l'espèce humaine.*
Iannis Xenakis (mail to Bob Wilson, October 29, 1999)

The diversity of Sixxens constructed is quite evident in the previous chapter. Even if the discussion was based on a more historical context and from the perspective of the percussion ensembles, the constant variation of products based on Xenakis' initial concept is already evident. However, the diversity of this instrument and its dispersal and representation in different countries needs to be better pointed out and specifically addressed. Only one previous publication discussed these aspects (Morais, Chaib, & Oliveira, 2018), but it will be shown here that the data collected until then by the authors was only a fraction of a larger panorama. Thus, this chapter will show how profound considerations regarding the Sixxens constructed could represent a broader picture and highlight an interesting engagement that the percussionists establish towards Xenakis' music.

The extensive review considered the institution, ensemble, or musician responsible for their construction (or where or with whom a Sixxen could be, and the groups that generally used or still use it). It will further account for the country of origin and the main constitutive characteristics (type of metal, shape of the bars, spatial disposition of the bars, presence of dampening pedal or resonator tubes, pitch collection, and mallet choices). To illustrate the specific qualities of each possibility, compare different ones, and consider eminently qualitative issues, examples will be shown for each category of constituent part generally present in a Sixxen. Then, a comprehensive review of the prototypes will be presented, addressing new data treated from a quantitative perspective.

Groups that construct a Sixxen, promote a concert with *Pléïades,* or commission new pieces for Sixxen sometimes provide clues about the object they produced through different announcements. Because of the diverse sources, an extensive review of documents and sources was necessary to gather the final data. This research considers diverse sources of information (bibliographic sources, periodicals, websites, audiovisual records, booklets of CDs and DVDs, critique notes and reviews of recordings, concert programs, social media environments, and personal contacts with professionals) to achieve the most extensive overview possible.

## 10.1 The construction of a Sixxen

*On est dans la création là, rien n'est absolu.*
*Sylvio Gualda* (interview by author, 2020)

A comparative analysis of the various Sixxens found is enough to understand the enormous variety of sounds, shapes, and spatial arrangements of bars and metallic materials used in their construction. From this perspective, each process of construction and creation of a Sixxen is also an integral interpretative process of *Pléïades* because, after all, new sonorities emerge, new timbres are highlighted, and new ways of performing the work are elaborated. However, while it is true that each process of creation of a Sixxen generates an enormous variety of results, it is also true that there are, in the set of instruments found in this research, a series of recurrent elements. Different Sixxens will be from now highlighted, and these constructs will be initially categorized according to the type of metallic material, bar profile, spatial organization of the bars, presence of dampening pedal, presence of resonators, pitch collection or search of specific frequencies, and mallet choices.

### 10.1.1 Metallic materials

About the material used to constitute the bars, Xenakis (1979, p. ii) made the following recommendations: "each one of the six percussionists uses 19 pieces of metal (brass, steel, etc...) which have approximately the same timbre "[1] and that it is "highly desirable that it should be a really interesting metallic tone. By interesting, we mean amazing, bizarre, full, resonant and without too much reverb, so that all the little rhythmic formulas are clear to the audience."[2]. The different metals used by percussion ensembles regarding the constructed prototypes are represented by different alloys of aluminum, brass, bronze, dural (also called duraluminum), iron, stainless steel, and steel, as the visual examples that follow could highlight (Fig. 10.1 to 10.6).

[1] "[...] chacun des six percussionnistes utilise 19 morceaux de métal (d'airain, d'acier, etc...) qui ont approximativement le même timbre." (Xenakis, 1979, p. ii).
[2] "Il est très souhaitable que la qualité métallique de ce timbre soit intéressante. Par intéressante, il faut entendre étonnant, bizarre, plein, résonnant et sans trop de réverbération, afin que toutes les petites formules rythmiques soient claires pour l'audience." (Xenakis, 1979, p. ii).

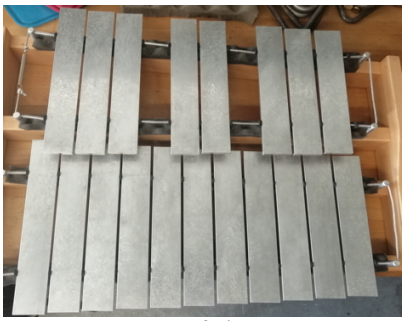
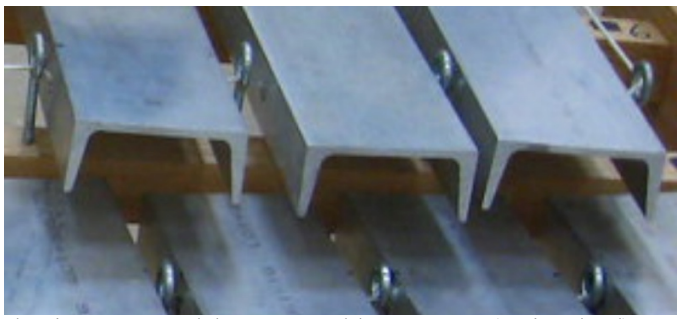
**a)**  **b)** 

***Figure 10.1***. Images of sixxens constructed with aluminum. **a)** Model constructed by Lunason (Switzerland). Source: Photo by the author. **b)** Prototype of Chamber Cartel (USA). Source: *https://mobile.twitter.com/chambercartel*.

**a)**  **b)** 

***Figure 10.2***. Images of sixxens constructed with brass or bronze. **a)** Brass prototype constructed by Kolberg to Les Percussions de Strasbourg (France). Source: Gabriel Bouchet's personal archives. **b)** Bronze prototype constructed by UFIP to Brake Drum Percussion (Italy). Source: Facchin (2000, p. 188).

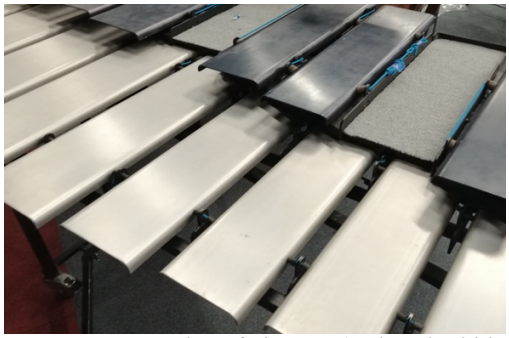
**a)**  **b)** 

***Figure 10.3***. Examples of sixxens (Hébrard-Abitbol model) constructed with dural (also called duraluminum). **a)** Les Percussions de Strasbourg (France). Source: Photo by the author. **b)** Kroumata Percussion Group (Sweden). Source: *https://twitter.com/PERCelleh/status/1042332182340100096*.

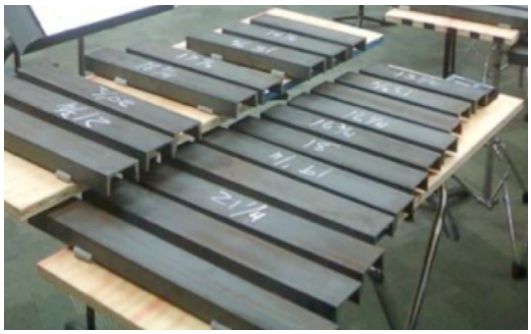
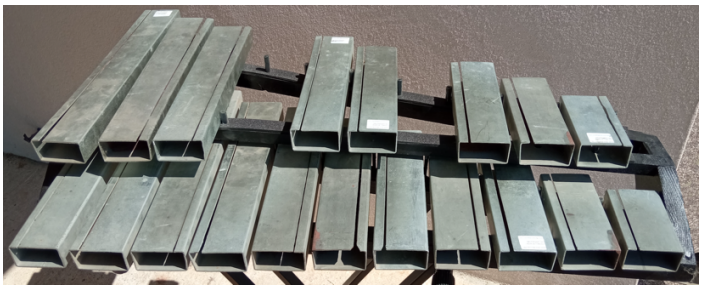
**a)**  **b)** 

***Figure 10.4***. Images of sixxens constructed with iron. **a)** University of Texas at Austin (USA). Source: *http://twitpic.com/3ycyfh*. **b)** Brake Drum Percussion (Italy). Source: Pietro Bertelli's personal archives.

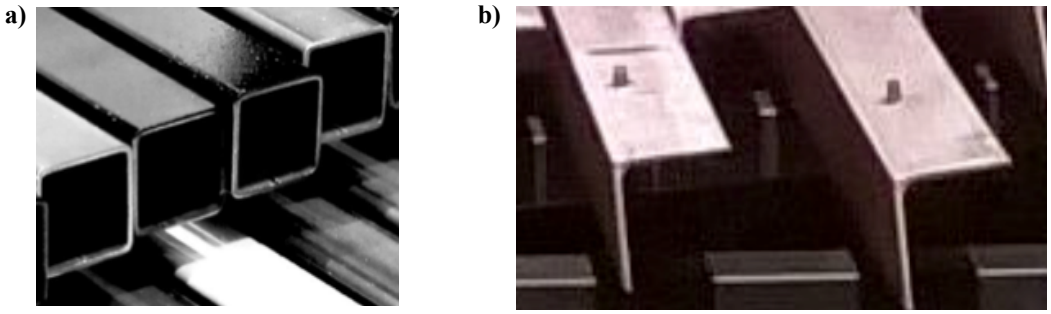



***Figure 10.5***. Examples constructed with stainless steel. **a)** Kuniko Kato (Japan). Source: *http://www.hyperion-records.co.uk/notes/204952-B.pdf*. **b)** Impact(o) (Brazil). Source: Photo by the author.

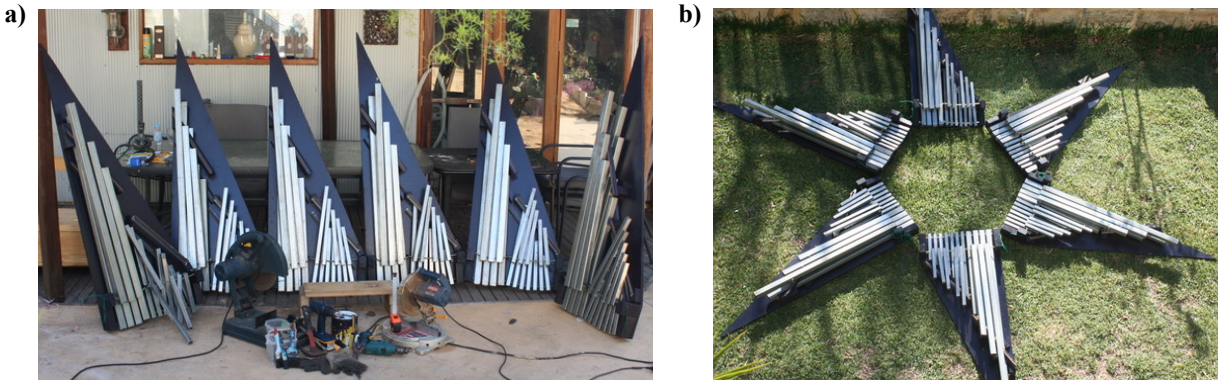



***Figure 10.6***. Examples constructed with steel. **a)** and **b)** University of Western Australia. Source of both: Paul Tanner's personal archives.

Synergy Percussion and Brake Drum Percussion made choices that implicated the use of different metals to produce the same Sixxen. As a blend of different metals to create a resultant timbre, these timbres will be later better discussed because it also implicates the use of different bar profiles.

### 10.1.2 Bar profiles

Xenakis did not provide any specifications regarding the profile of the material used to construct each of the 19 metal pieces that characterize a sixxen. As stated in an interview, when asked if he would prefer one specific kind of profile, Xenakis expressed that he just tended towards the inverted-U (Varga, 1996, p. 180). However, this was never an imposition, and many different profiles were used to construct his instrument. Essentially four main profiles can be observed in the present discussion: inverted-U, tube, flat bar, and inverted-L (Fig. 10.7).

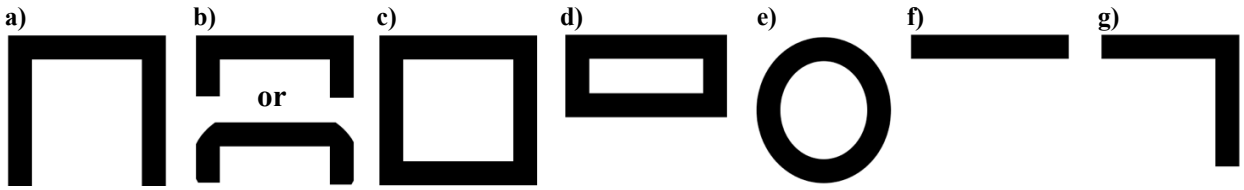



***Figure 10.7***. Types of bar profiles founded in different Sixxens during the prototype review. **a)** Inverted-U with equal sides. **b)** Inverted-U with unequal sides. **c)** Square tube. **d)** Rectangular tube. **e)** Round tube. **f)** Flat bar. **g)** Inverted-L.

The inverted-U (also called a channel), a sort of open profile, is characterized by two different possibilities, with unequal sides (when the lateral sides are smaller than the half of the upper side–Fig. 10.8a and b) and with equal sides (when the lateral sides are equal to the upper side or at least longer than half of the upper side–Fig. 10.8c). The flat bar (also called rectangular bar–Fig. 10.9) and the inverted-L (also called angle–Fig. 10.10) are also open profiles. On the other hand, the closed profiles are represented by three different kinds of tube forms: square (Fig. 10.11), rectangular (Fig. 10.12), and round. Among the practical examples (Fig. 10.8 to 10.12) that could guide the visualization of these materials, the majority use one specific profile for all six sixxens.

**a)** **b)** **c)**

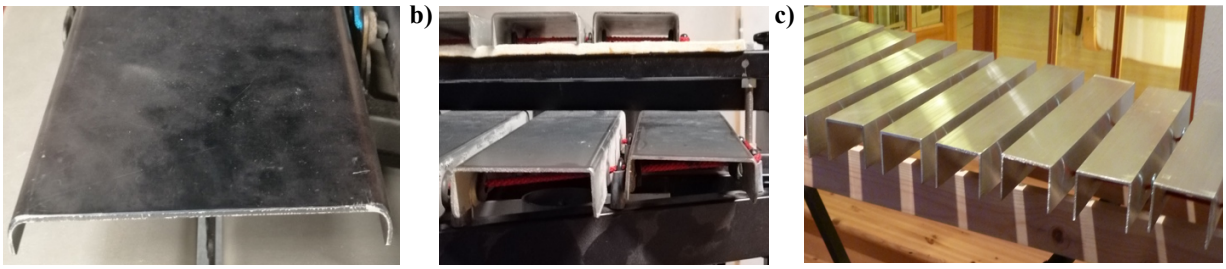


***Figure 10.8***. Examples constructed with an inverted-U profile on unequal sides (a, b) and equal sides (c). **a)** Les Percussions de Strasbourg (France). Source: Photo by the author. **b)** Les Pléiades ensemble (France). Source: Photo by the author. **c)** Red Note Ensemble (Scotland). Source: *https://tomdrums.wordpress.com/tag/sixxen/*.

**a)** **b)**

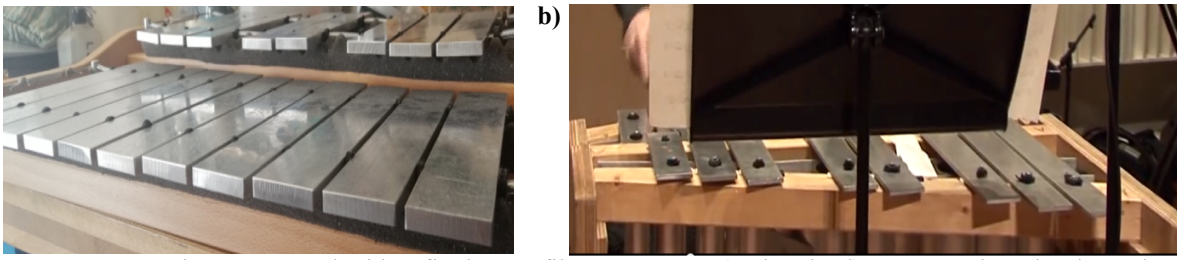


***Figure 10.9***. Examples constructed with a flat bar profile. **a)** Lunason (Switzerland). Source: Photo by the author. **b)** Slagwerk Den Haag (Netherlands). Source: *https://www.youtube.com/watch?v=OxDdCeWEUqg&ab_channel=RozalieHirs.*

***Figure 10.10***. Example constructed with an inverted-L profile: Impact(o) (Brazil). Source: Photo by the author.

**a)** **b)**

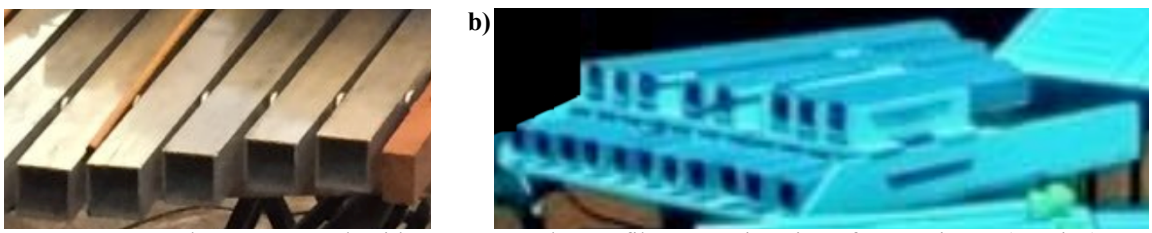
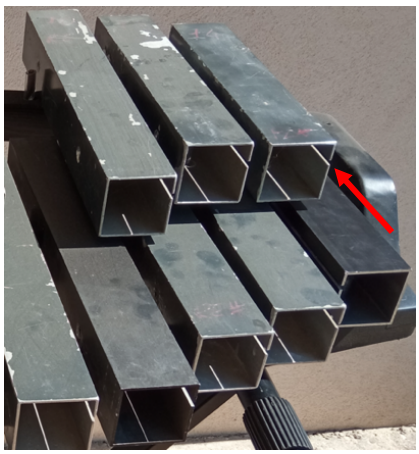


***Figure 10.11***. Examples constructed with a square tube profile. **a)** University of Guanajuato (Mexico). Source: *https://twitter.com/museoAmodernoMX/status/903030030003052546/photo/1*. **b)** Perpetuum Ritmico Ensemble (Latvia). Source: *https://www.facebook.com/photo/?fbid=505749580986923&set=a.509724845809442.*

**a)**  **b)** 

***Figure 10.12***. Examples constructed with a rectangular tube profile. **a)** TorQ Percussion Quartet group (Canada). Source: *https://www.facebook.com/torqpercussion/photos/a.10150130965795530/10156972741520530/?type=3.* **b)** Brake Drum Percussion group (Italy). Source: Lugo *et al*. (2007, p. 349).

On the other hand, some ensembles constructed prototypes with different metals and profiles at the same prototype, adding some diversity to the interior of the Sixxen timbre created. Brake Drum Percussion from Italy, e.g., developed an instrument with four different types of metal (aluminum, brass, bronze, and iron) and three different types of profiles (square tube, rectangular tube, and flat bar), as individually indicated in Fig. 10.13. This group also produced an interesting detail in their square and rectangular tube profiles (made of aluminum and iron, respectively). They cut one of the four sides producing a slit along the entire body of the bar (Fig. 10.13), allowing for more resonant bars. This is why the bars are just disposed on a simple frame that sustains them, and only the flat bar sixxens have a resonance box.

**a)**  **b)** 

↑ – slit all over the bar

***Figure 10.13***. Sixxen constructed for Brake Drum Percussion with different metals and profiles. **a)** Square tubes made of iron with slits. **b)** Rectangular tubes made of aluminum with slits. Source of all: Pietro Bertelli's personal archives.

The sixxens are essentially paired with two sixxens made of iron square tubes, two sixxens with rectangular aluminum tubes, and two sixxens with flat bars (one with bronze bars exclusively and the other with brass bars and one bronze bar). This kind of association results in a heterogeneity of timbres because each sixxen pair is essentially characterized by a particular sonority as a consequence of each peculiar structure (Fig. 10.14).


***Figure 10.14***. Representation of the gathering of different sixxens in the Brake Drum Percussion's prototype. Source: Pietro Bertelli's personal archives.

It is perceptible that this ensemble has sixxens with specific layouts that differ from one sixxen to the other, but that a sixxen taken individually is essentially made with the same metal and profile. That means that each sixxen is homogeneous in itself but that the complete Sixxen is heterogeneous; on a small scale, there is homogeneity, but on a large scale, there is heterogeneity.

On the other hand, the Australian ensemble Synergy Percussion adopted a different approach (Fig. 10.15). The ensemble used aluminum, iron, and steel as metallic materials in three different types of profiles (inverted-U with equal sides, inverted-U with unequal sides, and flat bar).

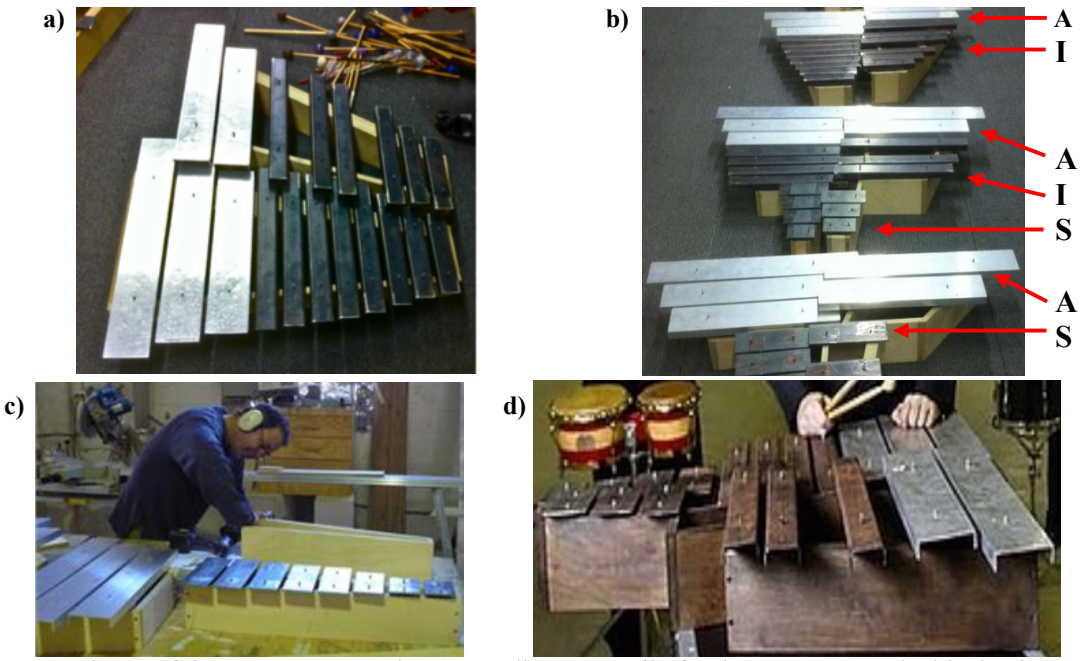



***Figure 10.15***. Sixxen of the Synergy Percussion (Australia): **a)** Detail of a sixxen constructed with aluminum and iron. **b)** Detail of 3 sixxens with different metals and bar profiles (classified as AI, AIS, or AS, or aluminum-iron, aluminum-iron-steel, and aluminum-steel). Source of both: *https://www.synergypercussion.com/*. **c)** Different metals and profiles during the construction. Source: *https://limelightmagazine.com.au/features/the-12-wackiest-musical-instruments/*. **d)** Detail of the prototype showing different metals and profiles. Source: Galvin (2014).

They have each sixxen as a blend of different metals and profiles (Fig. 10.15a), and those combinations are not homogeneous between the different sixxens. If considering A as aluminum (with inverted-U of unequal sides), I as iron (with inverted-U of equal sides), and S as steel (with flat bars), it is perceptible by their photos that the sixxens could be classified as containing AI, AIS, or AS (Fig. 10.15b), showing that the aluminum bars are the common characteristic of all sixxens, but that iron and steel are variable depending on the sixxen considered. Different from Brake Drum Percussion, this means that there is heterogeneity in the small scale of the sixxens taken individually. This decision allowed all sixxens a larger range and a change of timbre between areas on the same sixxen, as desired by the ensemble. Indeed, new types of profiles could still be interesting in constructing a Sixxen[3]. Many more possibilities will undoubtedly emerge due to percussionists' continued interest in playing Xenakis' piece.

### 10.1.3 Spatial dispositions of the bars

Another essential element that the ensembles had to pay attention to was tied to the bars' disposition. To accomplish that, three elemental choices were important and are quite common between different prototypes: the disposition of the bars vertically or horizontally, the creation of one or two playable surfaces of bars, and the organization of the sequence of the bars (that will be called explicitly as the layout of bars).

The horizontal disposition of bars represents almost all Sixxen created heretofore; the only exception is tied to the vertical disposition of the prototype created by Kolberg[4] for Les Percussions de Strasbourg (Fig. 10.16a). Just after the premiere of *Pléïades* during the ballet *Le Concile Musical*, the group immediately changed its configuration and adopted a horizontal disposition with the same bars and the same discontinuous layout (Fig. 10.16b).

**a)** **b)**

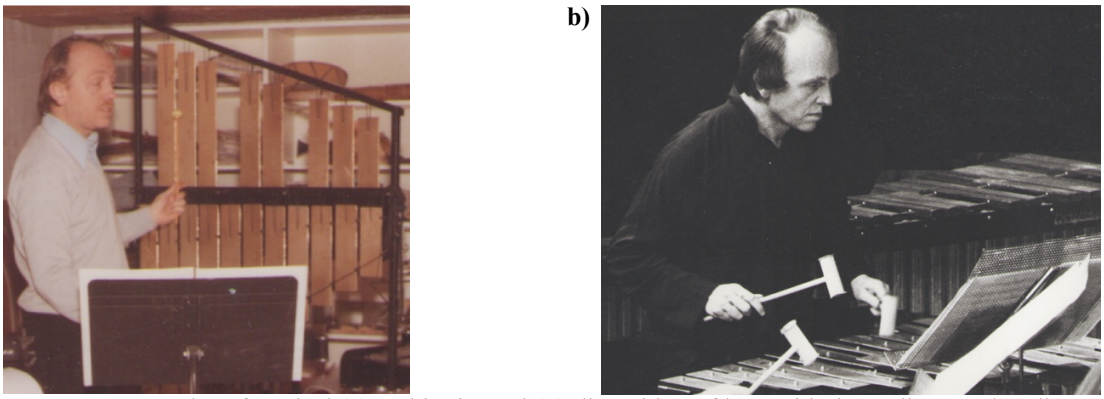


***Figure 10.16***. Examples of vertical (**a**) and horizontal (**b**) disposition of bars with the Kolberg and Kolberg-*Rythmes et Sons* prototypes of Les Percussions de Strasbourg (France). Source of both: Gabriel Bouchet's personal archives.

[3] See also Chapter 8–Subsection 8.1.4.1.
[4] See more details in Chapter 2–Sections 2.2.1 and 2.2.2, as well as Chapter 9–Section 9.1.1.

With a horizontal disposition of bars, another characteristic must be necessarily considered. The bars can be placed all at the same height as a unique layer that gives a single surface with which the musician has to interact (something typical of the vibraphones, e.g.). The bars can also be played at different heights, requiring the musician to play on at least two different surfaces (something that generally occurs in the disposition of xylophone and marimba, e.g.). These possibilities present potential configurations in a side and top view, as indicated in Fig. 10.17. With these aspects clear, some examples of practical results in different Sixxens are highlighted in Fig. 10.18. Some prototypes can vary between two height levels, presenting both possible arrangements.

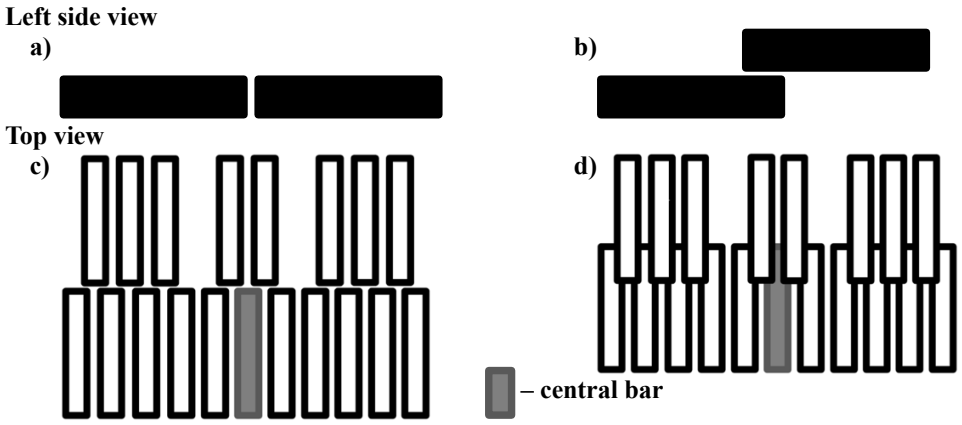



***Figure 10.17***. Schematic representations of side and top view to differentiate some Sixxens constructed. **a)** Left side view of a sixxen with one surface of bars. **b)** Left side view of a sixxen with two surfaces of bars. **c)** Top side view of a sixxen with one surface of bars. **d)** Top side view of a sixxen with two surfaces of bars superposed.

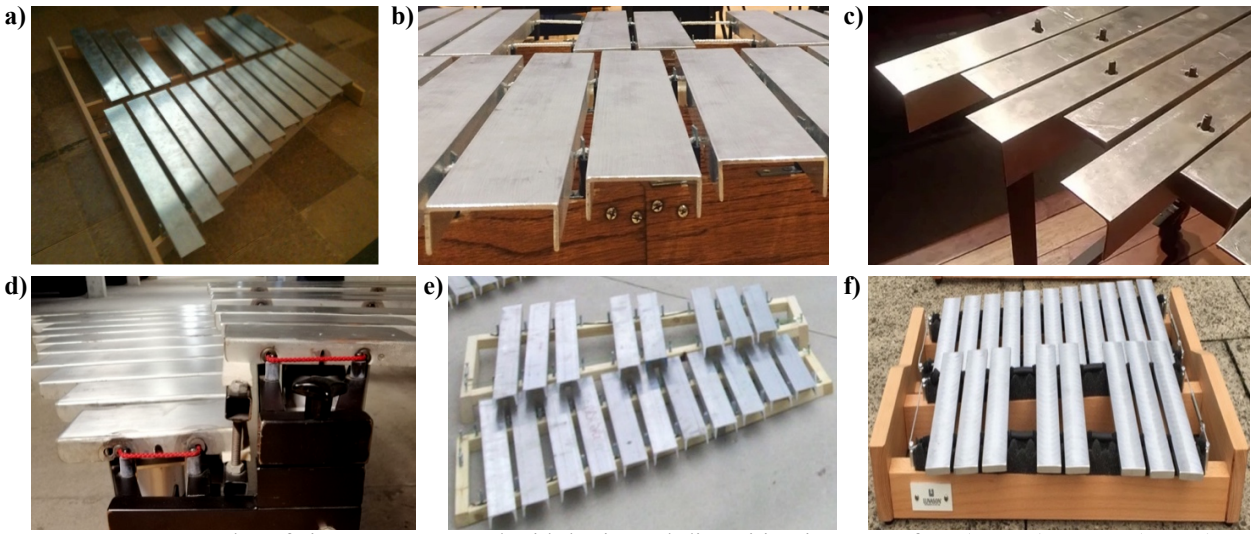



***Figure 10.18***. Examples of sixxens constructed with horizontal disposition in one surface (**a**, **b**, **c**) or two (**d**, **e**, **f**). **a)** Third Coast Percussion group (USA). Source: *https://www.instagram.com/thirdcoastpercussion/*. **b)** Eastman School of Music (USA). **c)** Impact(o) group (Brazil). Source: Photo by the author. **d)** Les Pléiades ensemble (France). Source: Photo by the author. **e)** Clocks in Motion group (USA). Source: *https://clocksinmotionpercussion.com/memo-to-composers/*. **f)** Lunason (Switzerland). Source: *https://www.lunason.com/english/sixxen/*.

A third and last aspect of the spatial disposition of bars is also perceptible when differentiating

prototypes. It is tied to the sequence of notes from lower to higher bars and could be described as a continuous or discontinuous layout. A continuous layout indicates that the bars are organized one after the other without possible interspaces between (Fig. 10.19a, b and c). On the other hand, a discontinuous layout indicates that the bars do not have a constant presence of bars one after the other; in this case, that creates some spaces between specific bars (Fig. 10.19d). This characteristic is independent of the previous types of disposition described; a vertical disposition could thus be continuous or discontinuous, and a sixxen with one surface or another with two surfaces could also be continuous or discontinuous.

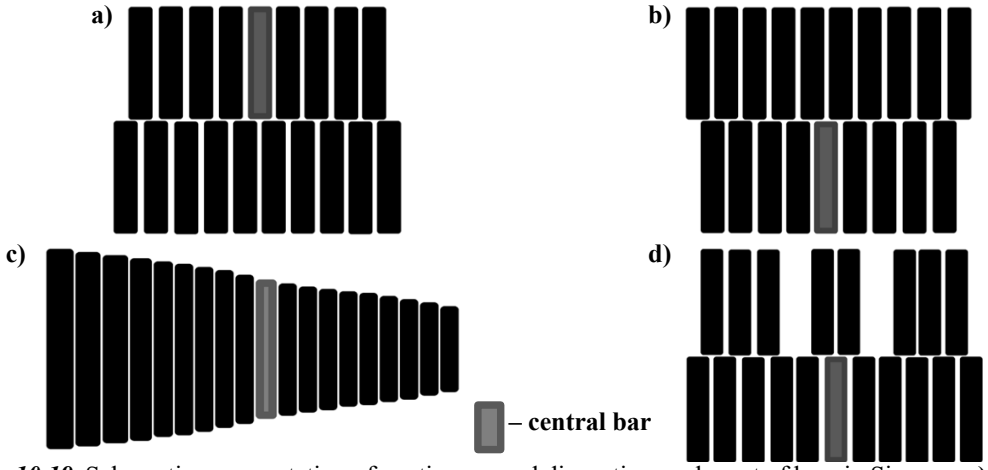



***Figure 10.19***. Schematic representation of continuous and discontinuous layout of bars in Sixxens. **a)** Continuous layout (disposition adopted by Warsaw Percussion Group). **b)** Continuous layout (Kuniko Kato). **c)** Continuous layout without disposition in two groups of bars (first prototype of Les Pléiades). **d)** Discontinuous layout.

Most of the Sixxens found during the research present a discontinuous disposition of bars. The only exceptions are the prototypes developed by Les Pléiades and Silvio Gualda (in the 1980s), Warsaw Percussion Group (in the 1980s), and Kuniko Kato (in the 2010s), as shown in Fig. 10.20.

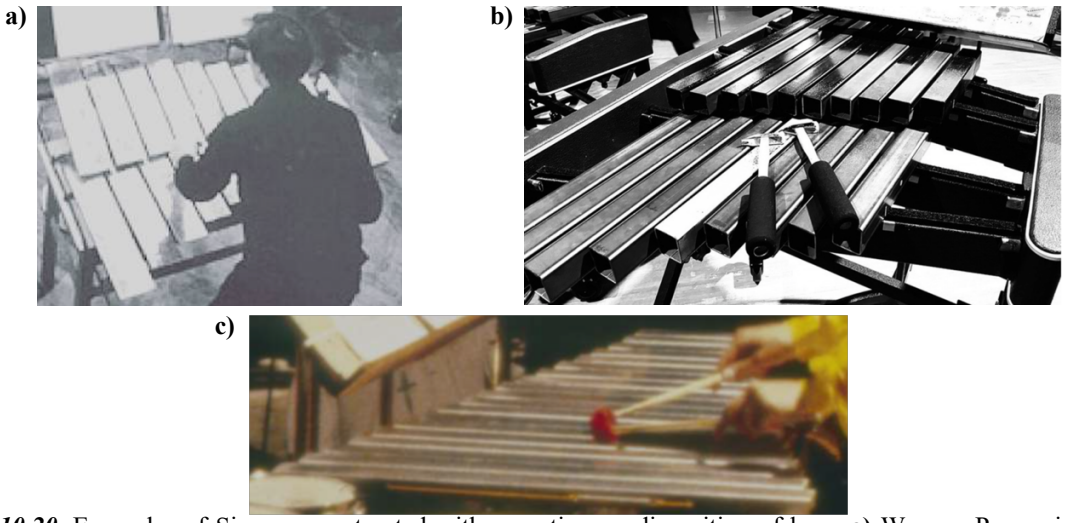



***Figure 10.20***. Examples of Sixxens constructed with a continuous disposition of bars. **a)** Warsaw Percussion Group (Poland). Source: © POLMIC. **b)** Kuniko Kato (Japan). Source: *https://ameblo.jp/xenakis-et-le-japon/entry-12627188899.html.* **c)** Les Pléiades & Sylvio Gualda (France). Source: © Famille I Xenakis DR.

All those spatial dispositions applied on Sixxen are contrasting, each allowing a specific way to interpret the piece. Many more potential dispositions could be used and were not found during this research or maybe not tried yet. Some instruments present unique configurations that could allow new ways to create a Sixxen and to perform *Pléïades*. The four-row xylophone or the diamond marimba created by Harry Partch, e.g. (Fig. 10.21) are just some examples that could bring new insights into possible different dispositions to a Sixxen, also turning possible to the performer specific ways to phrase and articulate.

**a)** **b)**

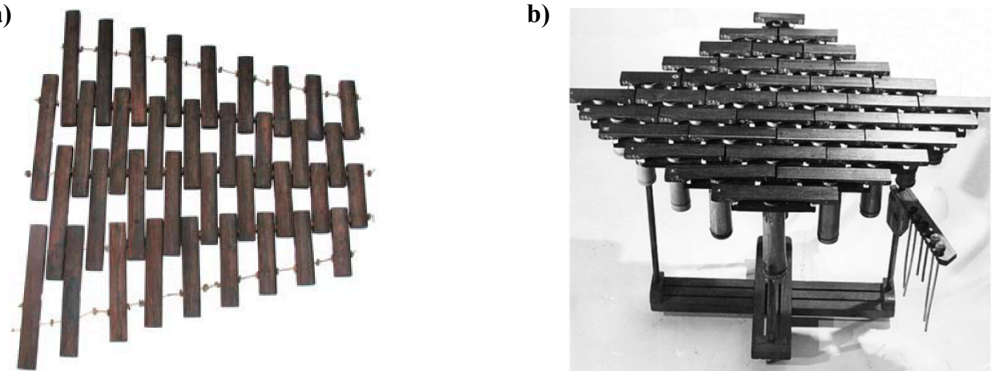


***Figure 10.21***. Particular spatial disposition of bars in percussion instruments. **a)** The four-row xylophone designed as a horizontal keyboard with one surface and a continuous layout. Source: Eyler (2003). **b)** The diamond marimba was created by Harry Partch as a horizontal keyboard with thirty-six bars distributed in eleven surfaces presented in a continuous layout. Source: *http://archive.soundamerican.org/sa_archive/sa6/.*

### 10.1.4 Pedaling mechanisms

Xenakis did not directly indicate the need for a control mechanism of the bars' resonance, and the score does not indicate a specific notation that could precisely point to a dampening or pedaling. The only few words about were stated in the introduction of *Pléïades* when he affirmed that a sixxen "must be resonant, and without too much reverberation, so that the minutiae of the rhythmic patterns are clear to the audience"[5] (Xenakis, 1979, p. ii). He seems to want thus an instrument that can produce a great range of dynamics (eminently to the louder ones) but, at the same time, without too much resonance to have the rhythmic structures understandable. This could indicate some need for a mechanism to control the resonances. The composer never used dampening or pedaling indications on his instrument. However, the model that he helped to create in association with Robert Hébrard for Les Percussions de Strasbourg has a dampening pedal, the same for the Sixxen created with Bergerault for Sylvio Gualda and Les Pléiades (Fig. 10.22).

[5] "[...] résonnant et sans trop de réverbération, afin que toutes les petites formules ryhtmiques soient claires pour l'audience" (Xenakis, 1979, p. ii).

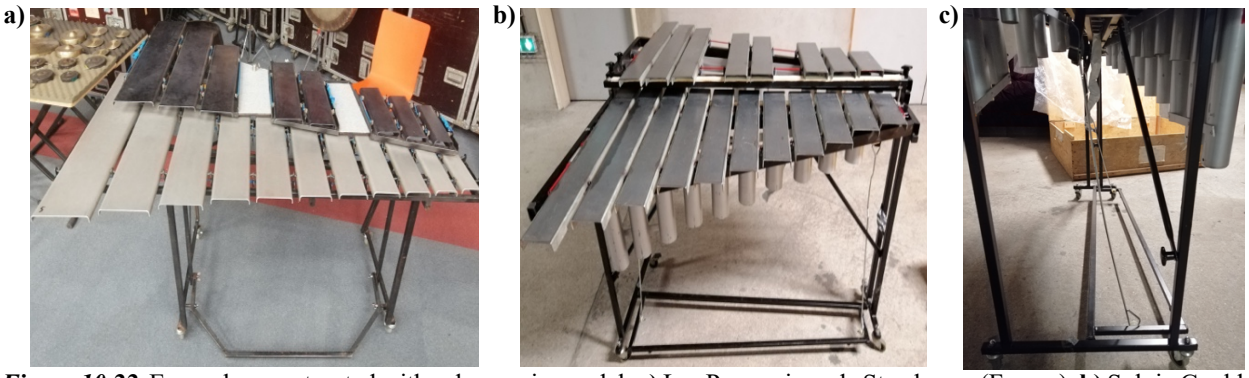



***Figure 10.22***. Examples constructed with a dampening pedal. **a)** Les Percussions de Strasbourg (France). **b)** Sylvio Gualda and Les Pléiades (France). **c)** Detail in a right side view of the pedal mechanism of b). Source of all: Photos by the author.

Even if *Pléïades* does not directly require dampening, building a pedal became fundamental in the posterior repertoire for sixxen. With the creation of works such as, for example, *Le livre des claviers* (1988-1989) and *Métal* (1995) by the French composer Philippe Manoury, a certain imposition of Sixxens with pedals appeared. In this work, the composer marked detailed control of the resonance of the bars through a specific pedaling notation on the score (Fig. 10.23).

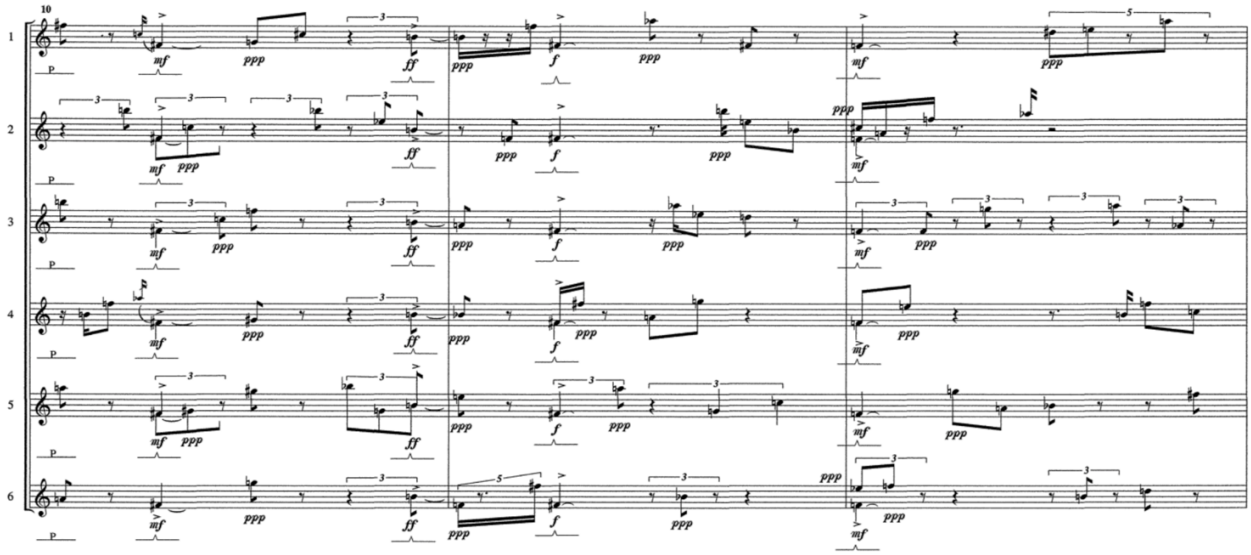


***Figure 10.23***. Indication of pedaling notation in *Métal* (1995) by Philippe Manoury. Source: *Métal*, meas. 10-12 (Manoury, 1995) – © Éd. Durand–Salabert.

This score is thus a consequence of the possibility of dampening that was created with the Hébrard-Abitbol model (Fig. 10.24). The damping system of this model is made of felt squares of different sizes, adapted to the dimensions of the bars (thus, there are larger ones for the lower notes and smaller ones for the high notes). The bars are always free and, therefore, freely resonate. If the percussionist activates the pedal, the bars are dampened.

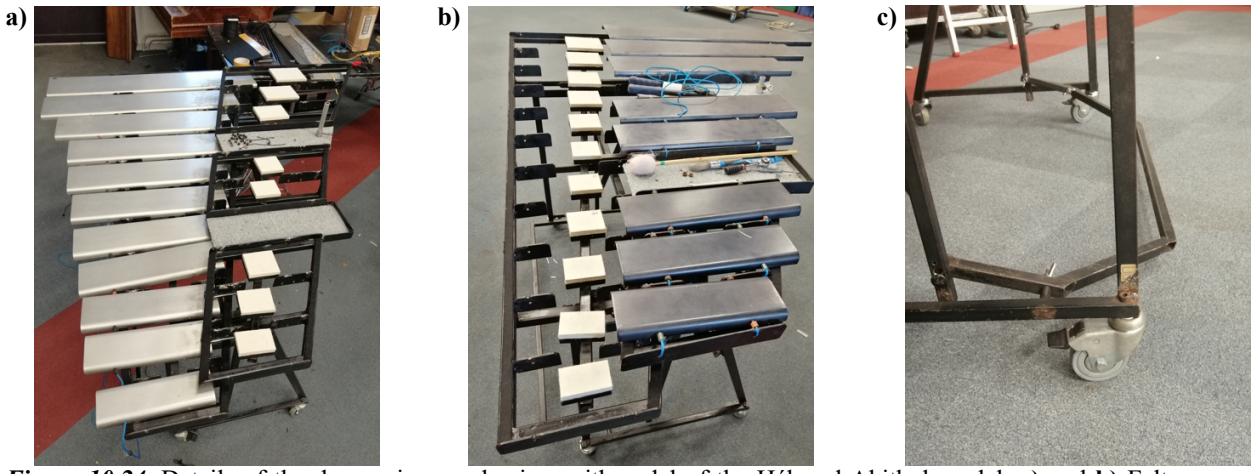


***Figure 10.24***. Details of the dampening mechanism with pedal of the Hébrard-Abitbol model. **a)** and **b)** Felt squares under the bars that dampen the bars. **c)** Detail of the pedal and its rotation axis. Source of all: Photos by the author.

In this way, because of a specific requirement in part of the repertoire, it would be interesting for the new groups to always imagine that their future Sixxen should have some dampening mechanism. This would not impose some limits in terms of repertoire accessible, and it would also make possible a more varied pallet of dynamics and timbres for the composer with whom the groups would be working in future projects. The presence of a pedal occurs, even if not predominant, in different prototypes and by diverse mechanisms, some using parts of other instruments also, as in the case of Joshua Dreyer's prototype that uses a hi-hat stand (Fig. 10.25).

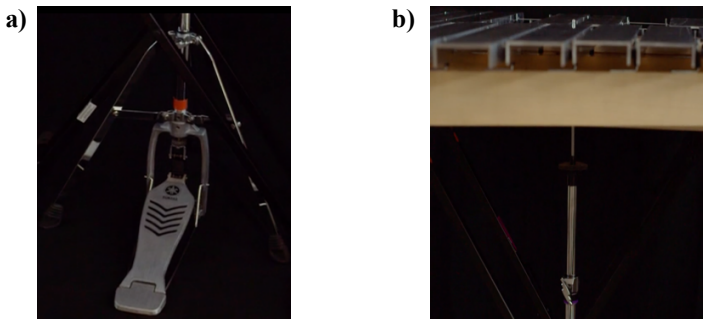


***Figure 10.25***. Details of the pedal mechanism for Joshua Dreyer's Sixxen by applying a hi-hat stand. **a)** Pedal detail. **b)** Hi-hat connection with the sixxen. Source of both: *http://www.joshuadreyermusic.com/articles/.*

The many aspects previously discussed (type of metal, bar profiles, and spatial disposition of the bars) have a direct connection with the production of a dampening mechanism, imposing some limits and challenging the constructor to produce an adequate structure. The bars at the same level allow the installation of a single mechanism that dampens all metal parts simultaneously. It is also possible to produce a dampening mechanism with two different surfaces, but something much more complex has to be developed. Thus, this could indicate that the project has to be conceived as a whole to match the performer's individual needs and the ensemble.

### 10.1.5 Frequency amplification mechanisms and resonance stimulus

Xenakis left no explicit indication or suggestion about using implements to amplify the sound of the 19 pieces of each sixxen (as previously indicated, he wanted something "resonant, and without too much reverberation"). He was clear about powerful dynamics but with little reverberation and a clear perception of the attack and the rhythmic elements. Among the prototypes found, there are three ways to deal with the amplification of the bars: resonator tubes, resonance boxes, or a choice of material that does not need amplification. Some examples of the presence of resonators (similar to those used in marimbas and vibraphones) are indicated in Fig. 10.26. Bergerault even developed double resonators for the lowest bars of its Sixxen model, which results in the stimulation of different harmonics of the same bar (Fig. 10.26b). This Sixxen was constructed with Xenakis and could be a consequence of his interactions and specific interests when working with an inverted-U profile. The presence of resonance boxes under the metal pieces (similar to some traditional instruments such as in certain gamelan ensembles, e.g.) is exemplified in Fig. 10.27. The simple absence of structures for amplification is very common on Sixxen, because the material chosen is generally very loud, and with enough resonance so the bars can sound by themselves, as shown in Fig. 10.28.

**a)**  **b)** 

***Figure 10.26***. Presence of resonators. **a)** Slagwerk Den Haag group (Netherlands). Source: *https://www.youtube.com/watch?v=OxDdCeWEUqg&ab_channel=RozalieHirs*. **b)** Detail of the double resonators constructed for Les Pléïades by Bergerault (France). Source: Photo by the author.

**a)**  **b)** 

***Figure 10.27***. Examples of resonance boxes used to amplify sixxen bars. **a)** Brake Drum Percussion group (Italy). Source: Facchin (2000, p. 188). **b)** Synergy group (Australia). Source: Galvin (2014).

**a)**  **b)** 

***Figure 10.28***. Sixxens without any resonance mechanism. **a)** Impact(o) group (Brazil). Source: Photo by the author. **b)** Bell Percussion (England). Source: *https://www.bellperc.com/products/sixxen?_pos=1&_sid=0eaab770e&_ss=r.*

### 10.1.6 The search for microtonal scales: between harmonic and inharmonic tones

In Xenakis' description of the SIX-XEN, there is no mention of frequencies or specific pitches and ranges to be heard. He stayed particularly concerned about the intervals in one sixxen ("The 19 pitches must not form tempered chromatic or diatonic relationships"[6]–Xenakis, 1979, p. 16) and the difference between sixxens ("these six notes, taken two by two, should not be in unison"). However, he added no more than this, giving once again an open description of it ("The range of the 19 steps is arbitrary and will depend on the available pieces"). The constructor can thus act in many ways to interfere with the instrument's frequencies. As Ceuster (2021, p. 81) stated, "The tuning of the sixxen is the first and foremost feature in which the complexity of the sound structures can be increased relative to an imaginary rendition of the same music in equal temperament." It is thus necessary to mention some cases in which a specific tuning was explicitly developed.

During the interviews and exchanges, it was clear that the search for a specific timbre primarily guided constructors, not searching for determined frequencies at all (the relative differences between the frequencies of sixxens being consequential and not a determinant or direct approach). However, some projects and some constructors were specifically guided to achieve a precise balance between harmonic and inharmonic pitches, creating a correlation with a specific scale or at least the possibility of hearing a reference to something that could be perceived as one. The choice of metal (and, by consequence, certain aspects of the timbre) was somehow made in function of a better possibility to perceive those specific frequencies.

In this way, the 2015 project developed for the *Zürcher Hochschule der Künste* (Switzerland)

[6] "Les 19 hauteurs ne devront pas former des rapports chromatiques ou diatoniques tempérés. Les pièces devront sonner faux entr'elles. L'ambitus des 19 échelons est arbitraire et dépendra des pièces disponibles ; mais il sera le même pour les six percussionnistes et placé dans les mêmes registres. Ceci signifie que pour une hauteur donnée, les six pièces de métal devront seulement approximativement la hauteur donnée ; il est même recommandé à ce que ces 6 notes, prises deux à deux ne soient pas à l'unisson, l'écart pouvant être compris entre +3/4 et -3/4 de ton de la hauteur donnée. [underline added]" (Xenakis, 1979, p. 1).

resulted in a Sixxen with clear pitches in one of its unities. The constructor Andreas Ermatinger that was responsible for the company Giannini Swiss Drums interpreted that, because the score was notated from $F^4$ to $B^5$, he should respect at least the range and the presence of those notes in one of the sixxens, deviating the other ones with higher or lower frequencies. When interviewed by Bogler (2017, p. 21), he stated that "The middle instrument [sixxen C] is tuned exactly to 443 Hz. The others are tuned higher or lower. This is easily done with a professional tuner."[7] This aspect creates a very particular Sixxen, with the solo of player C (meas. 79-83) denoting a chromatic passage that is not heard in any other Sixxen and with other passages in the duo extremely unique, because of the presence of perceptible pitches from $F^4$ to $B^5$. The constructor considered that because Xenakis "wrote it as C, that is why we tuned it that way"[8] (Bogler, 2017, p. 22).

This was not the unique try to have a Sixxen that can produce more perceptible references when heard. In 2022, Pedro Carneiro (Portugal) also developed a prototype based on specific frequencies and pitches. He respected the distances and differences necessary between sixxens, but he based the distribution of frequencies on the sieve that Xenakis created for *Jonchaies* and «*Claviers*». As he stated, they tried to achieve: "compressing scales with the gamelan 'flavor' of *Jonchaies* but compressed with the same ratio and smaller range."[9] (Pedro Carneiro, email to author, March 25, 2022). Thus, it is perceptible that even if not the priority for many projects, developing a Sixxen with specific frequencies motivated some constructors and percussionists. These attempts allow one to hear particular scales and references of pitches (or at least be guided to perceive something like it). As mentioned by Ceuster (2021, p. 97), "If according to the composer, the primordial element of «*Métaux*» is rhythm, then some ensembles subvert this element by introducing resonance, noise, and ambiguous pitch." Thus, based on the description that Xenakis left and the openness that it carries, many approaches were developed, many ways to produce a resultant object were tried, and much more will still appear.

### 10.1.7 Mallet choices

A further element essential to address is not a structure, a mechanism, or a part of the instrument, but it is what makes the instrument possible to play: the mallets that will strike the bars. The mallets are the connection between the musician and the instrument/sound. These objects are fundamentally

[7] The complete context of the discussion is: "Das mittlere Instrument ist genau auf 443 Hz gestimmt. Die anderen jeweils höher bzw. tiefer. Mit einem professionellem Stimmgerät ist da gut machbar. Auch dann, wenn man das alles weiß, ist das eine Lotterie. Weil beim Instrumentenbau weißt du erst wenns fertig ist, was es wird. Das ist beim Schlagzeug immer so ein bisschen das Problem. Das, was du das erste Mal machst, weißt du nicht wie das tönt." (Bogler, 2017, p. 21).
[8] "Er hat es als C geschrieben, deshalb haben wir es so gestimmt." (Bogler, 2017, p. 22).
[9] "[...] usamos este patch de Max para a afinação, comprimindo escalas com o 'sabor' gamelan de Jonchaies, mas comprimidas com o mesmo rácio e âmbito menor." (Pedro Carneiro, email to author, March 25, 2022).

varied from group to group and piece to piece and will now be discussed.

Mallet choice is always very particular, tied to each musician, each physicality, and the perception of how it produces a resultant sound in a specific space. It depends thus on many factors and characteristics, but in the case of *Pléïades*, the construction of a Sixxen could also implicate some specific choices. Mallets are not a structure of the Sixxen constructed, but the diversity of choices found during this research could point to an interesting aspect that connects the Xenakian instrument and the posterior interpretative choices. As a result of personal and collective perspectives and aesthetics associated with aspects of the previous topics (such as the choice of a specific metal, e.g.), the choice of mallets presents an essential element of the instrument's sound production. Mallets help develop the instrumental spectra at the same time that it helps to delineate some dynamics, articulate specific phrases, and to emphasize specific musical structures. In terms of interpretative approaches, it is a fundamental object that connects the musician to the instrument.

Interestingly, in this case, Xenakis even indicated explicitly in the original score that a metal hammer should be used ("Use metal hammers."[10] – Xenakis, 1979, p. 16). In posterior interviews, he reiterated quite the same when stating, "Of course, it's difficult to obtain the quality of sound I'm asking for. I told [the musicians of Les Percussions de Strasbourg that] it was to differ from the so-called percussion instruments, whether hit by hammer or otherwise." (Varga, 1996, p. 180). A drawing in the manuscript shows that Xenakis developed ideas about a new mallet to be used with Sixxen (Fig. 10.29). It was a kind of hammer that would have at its ends two different materials (a plastic material allowing a softer attack and a metal material for a harder one).

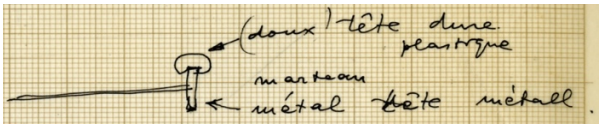



***Figure 10.29***. Specific double tone (plastic and metallic) hammer imagined by Xenakis in manuscripts of *Pléïades*. Source: © Famille I Xenakis DR (OM 28-17, p. 15).

At no point, Xenakis mentioned a particular metal or profile that should necessarily be used in the constitution of the bars of a Sixxen, but with the mallets, he originally imagined something very specific and even registered it in the original score. The musicians that worked with him also described the composer's concern when discussing the instrument's sonorities and the characteristics of its attack and dynamics. As Keiko Nakamura (Les Percussions de Strasbourg) stated:

> it's not only sixxen with mallets and hammers, we used different mallets at the same time, to let sound, we worked like that with Iannis. It is necessary to use several mallets at the same time to let sound a note. And that, with Iannis it was always like that. He wanted the sonority that he wanted to hear, we try, try... so each time we made many tests. [...]

[10] "Employer des marteaux métalliques." (Xenakis, 1989, p. 16).

> And in fact, according to the notes, he changed the mallets. So, for example, the sixxen at the end [of «*Métaux*»] there is "tamtamtamtamtamtam..." all in unison, there we don't all have the same mallets. He gave the indication to everyone, because each bar is different. That the percussions today they do not know it any more.[11] (Nakamura, interview by author, 2020).

In the search for specific sonorities and appropriate mallets, she even stated that, for the first recording by the ensemble, Xenakis asked different mallets all the time, sometimes with each musician using a specific mallet, not calibrated with the others or even sometimes the same musician using different mallets between left and right at the same time. Those experiences with mallets to achieve specific attacks occurred again with the ensemble Les Pléiades. As Eve Payeur (interview by author, 2019) stated:

> with the sixxen he always wanted us to play, if we could have taken heavy hammers, if we had not broken the instrument, we would have done it, that's what he always wanted. He always wanted the extreme and that it should be "détimbré", that's why he made these 6 notes, that each note was around, that you never heard a C sharp... It was only quarter tones, thirds of a tone, around a pole of notes, but not at all a tempered scale. [...]
> It must be said that at one point we had made a kind of mallet that was not too big, to have this kind of repetitive bell sound at one point and Xenakis had originally thought of it but it was he who said "but look, if we put a mass like this, we'll have a sound more..." we had also made big wooden mallets, thicker and much bigger than those of xylo, to have more mass too. Round, really a xylo mallet, but the big one, the one you take for the anvils or... well there you go. And afterwards, in the high-pitched sounds, he always referred to the *Corypheus*, in ancient Greece, this kind of cry, so we had to find this tension all the time. And Xenakis was in the tension, in the saturation, so there you go, he modulated that. [...]
> He was only in saturation, the sixxen was that, he wanted a raw instrument.[12]

This means a lot about his approaches and thinking (see more details also in Chapter 3 about the manuscripts and Chapters 6 and 7 about the potential connection with Indonesian traditions), but it also turned possible for a variety of actual mallets to be used. By observing different performances of *Pléïades* and other pieces, one can see the diversity of the mallets used (Fig. 10.30).

---

[11] "[...] ce n'est pas uniquement sixxen avec baguettes et marteaux hein, on a utilisé différentes baguettes en même temps, pour laisser sonner, ça on a travaillé avec Iannis. Il faut utiliser plusieurs baguettes en même temps pour laisser sonner une note. Et ça, Iannis c'était toujours ça. Il voulait la sonorité qu'il avait envie d'entendre, on essaye, essaye… donc à chaque fois on a fait plein d'essais. [...]
Et en fait, suivant les notes, il changeait les baguettes. Donc par exemple les sixxen à la fin il y a 'tantantantantantan…' tous à l'unisson, là on n'a pas tous les mêmes baguettes. Il a donné l'indication à chacun, parce que chaque lame est différente. Ça les percussions aujourd'hui ils savent plus." (Nakamura, interview by author, 2020).

[12] "[...] avec les sixxens il voulait toujours qu'on joue, si on avait pu prendre des marteaux lourds, si on n'avait pas cassé l'instrument, on l'aurait fait, c'est ce qu'il voulait tout le temps. Il voulait toujours l'extrême et que ça soit détimbré, c'est pour ça qu'il a fait ces 6 notes, que chaque note était autour, qu'on n'entende jamais un do dièse… C'était que des quarts de ton, des tiers de ton, autour d'un pôle de notes, mais pas du tout une gamme tempérée quoi. [...]
Il faut dire à un moment on avait fabriqué une espèce de batte pas trop grosse, pour avoir cette espèce de son répétitif de cloche à un moment et Xenakis à la base il y avait pensé mais c'est lui qui disait « mais regarde, si on met une masse comme ça, on aura un son plus… » on avait fabriqué aussi des grosses baguettes de bois, plus épaisses et beaucoup plus grosses que celles de xylo, pour avoir plus de masse aussi. [RG : Presque une batte en fait, une batte de tambour en bois.] Oui, ronde, vraiment une baguette de xylo, mais la grosse grosse, celle qu'on prend pour les enclumes ou… fin voilà. Et après pareil, dans les sons suraigus, il nous faisait toujours référence au Coryphée, dans la Grèce antique, cette espèce de cri, donc il fallait qu'on retrouve cette tension tout le temps. Et Xenakis il était dans la tension, dans la saturation, donc voilà il modulait ça. [...] Il était que dans la saturation, les sixxens c'était ça, il voulait un instrument brut." (Payeur, interview by author, 2019).

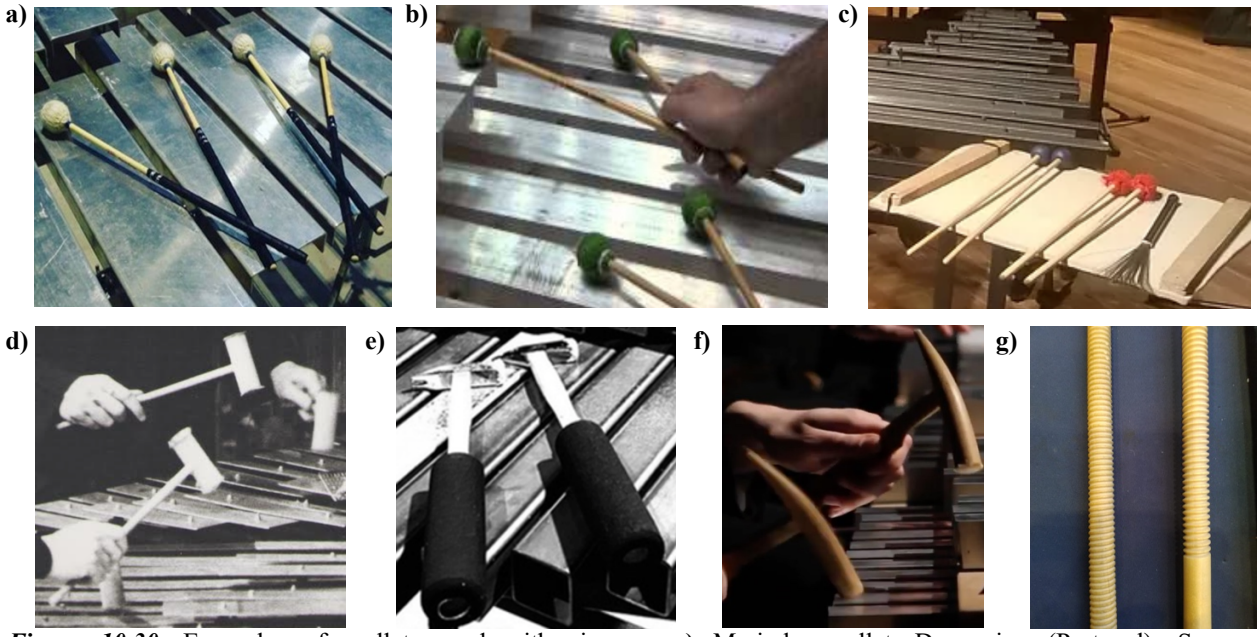


***Figure 10.30***. Examples of mallets used with sixxens. **a)** Marimba mallets–Drumming (Portugal). Source: https://www.walcheturm.ch/archive/artists/mark-fell-and-grupo-de-percussao. **b)** Vibraphone mallets–Clocks in Motion (USA). Source: *https://www.facebook.com/ClocksInMotionPerc/photos/?ref=page_internal.* **c)** Xylophone mallets (blue), vibraphone mallet (red) and brushes–Impact(o) (Brazil). Source: Photo by the author. **d)** Tubular bell hammers–Les Percussions de Strasbourg (France). Source: Gabriel Bouchet's personal archives. **e)** Hammers–Kuniko Kato (Japan). Sources: *http://www.hyperion-records.co.uk/notes/204952-B.pdf.* **f)** Gamelan hammers–Percurama (Denmark). Source: *https://www.youtube.com/watch?v=SyA9yuC83ps&ab_channel=ArtBEAT.* **g)** Rasping sticks–*Hochschule für Musik Basel FHNW* (Switzerland). Source: Photo by the author.

The metallic hammer described in the original score was also not imposed at the end by Xenakis because even the groups that he worked with (Sylvio Gualda and Les Pléiades, Les Percussions de Strasbourg after the creation and the first concerts, e.g.) were not using something like that in their performances. It is evident in some photos that the composer was concerned about using mallets or how it would affect the sound of a Sixxen. In a mail exchange with Claude Ricou, he stated: "I wonder if it wouldn't be interesting to use harder sticks so that the sound would be less soft or is it a question of recording?"[13] (Iannis Xenakis, mail to Claude Ricou, December 16, 1985). Also, during the recording sessions of *Pléïades* with Les Percussions de Strasbourg in 1986, he was constantly photographed while discussing the mallets to be used (Fig. 10.31), something that seems thus fundamental and important to him.

[13] "Je me demande toutefois s'il ne serait pas intéressant d'utiliser des baguettes plus dures pour que le son soit moins mou ou bien est-ce une question d'enregistrement ?" (Iannis Xenakis, mail to Claude Ricou, December 16, 1985).

a)  b)  c) 

***Figure 10.31***. Xenakis at the recording session of *Pléïades*. **a)** Xenakis paying attention to the characteristics of a mallet (Gabriel Bouchet in the foreground). **b)** Xenakis paying attention to the sound quality of a yarn mallet. **c)** Xenakis testing a specific mallet. Source: Photo by Bernard Schmidle, Gabriel Bouchet's personal archives.

In terms of structure, the main aspects of the Sixxen were highlighted here. Some aspects could still be exposed, such as tempo, articulation, and phrasing, directly connecting with the structures described here. However, the main objectives here were to present an overview of the structures and how different percussion ensembles developed it. So now, with all these structural aspects in mind, it would be interesting to analyze these structural aspects more deeply as tendencies of construction worldwide.

## 10.2 A broad glimpse into the characterization and distribution of Sixxens

The discussion will now focus on a major aspect of the SIX-XEN construction, describing an extensive overview of the impact and consequences of Xenakis' instrument in the percussion community. The data here presented with the analysis of repertoire that will be discussed in Chapter 11 could also give a basis to understand the instrument in a major context and address if the object would be considered formally established in the musical landscape. It is also important to put in context the efforts and resources that many ensembles devoted to the composer's perspectives and the continuity of his thinking and work.

### 10.2.1 Overview of constructed prototypes

The prototypes found during the present research are summarily indicated in Table 10-1, which is organized by country and indicates the type of metal and bar profile.

***Table 10-1***. Sixxen prototypes created and organized according to the country and the particularities of construction (type of metal and bar profile).

| Country | Institution / Ensemble / Artist –Constructor | Metal | Bar profile |
|---|---|---|---|
| USA (25) | Arizona State University | Al | |
| | Baylor University / Line upon Line / Meehan–Perkins Duo | Al | |
| | Cassiopeia Sturm | Al | |
| | Chamber Cartel | Al | |
| | Clocks in Motion | Al | |
| | Crossing 32nd Street | Al | |
| | Eastman School of Music | Al | |
| | Garrett Mendelow | ? | |
| | Jacaranda Percussion Ensemble | ? | |
| | Joshua Dreyer | Al | |
| | Lagan Percussion | Al | |
| | LA Percussion Rental * | Al | |
| | Oberlin College | SS | |
| | Queens College – CUNY | Al | |
| | Rowan University | Al | |
| | SO Percussion / Meehan-Perkins Duo | Al | |
| | Stony Brook University / Juilliard Percussion Ensemble | Al | |
| | Talujon | Al | |
| | Third Coast Percussion | Al | |
| | University of California San Diego / Red Fish Blue Fish / Echoi | Al | |
| | University of North Carolina at Greensboro | Al | |
| | University of Tennessee Knoxville | Al | |
| | University of Texas at Austin | Fe | |
| | University of Wisconsin Madison / Madison Percussion Group | Al | |
| | Yale University | Al | |
| FRA (9) | *Conservatoire de Lyon* | ? | |
| | I–Kolberg | BR | |
| | II –Kolberg / *Rythmes et Sons* | BR | |
| | Les Percussions de Strasbourg III–Grimus | DU | |
| | IV–Yamaha | SS | |
| | V –ENSAM / Thinktone / *Rythmes et Sons* | DU | |
| | Les Pléïades & Sylvio Gualda I–Bergerault | Al | |
| | Les Pléïades & Sylvio Gualda / *Conservatoire de Saint Cloud* / Percussions de l'Orchestre National de France / Trio Xenakis II–Bergerault | Al | |
| | Symblema Percussions | ? | |
| DEU (6) | *Hoschule für Musik Freiburg* –Lunason | Al | |
| | *Hoschule für Musik und Darstellende Kunst Frankfurt am Main* | Al | |
| | *Hochschule für Musik und Theater Felix Mendelssohn Bartholdy Leipzig* | Al | |
| | *Musikhochschule Lübeck* / MHL–Schlagzeug-ensemble –Lunason | Al | |
| | Percussion Art Quartet / *Hochschule für Musik und Theater München* / Ensemble für percussive Kunst München | Fe | |
| | Schlagquartett Köln | Al | |

***Tab. 10-1***. Cont.

| Country | Institution / Ensemble / Artist –Constructor | Metal | Bar profile |
|---|---|---|---|
| AUS (5) | Nova Ensemble | Al | |
| | Synergy Percussion Group | Al | |
| | | Fe | |
| | | ST | |
| | Taikoz | Al | |
| | University of Melbourne | ST | |
| | University of Western Australia | ST | |
| CAN (4) | NMC / Nexus | ST | |
| | NYO Canada / Wilfrid Laurier University | Al | |
| | Sixtrum | Al | |
| | TorQ Percussion Quartet | Al | |
| NLD (4) | Nieuwe Slagwerkgroep Amsterdam –Pustjens Percussion | Al | |
| | Percussive Rotterdam | Al | |
| | Slagwerk Den Haag | Al | |
| | Tromp Laureates | Al | |
| CHE (3) | *Centre International de Percussion de Genève* / Eklekto / Usine Sonore | Al | |
| | Decibells –Lunason | Al | |
| | *Zürcher Hochschule der Künste* / Ensemble Arc-en-ciel / Cosmic Percussion –Giannini Swiss Drums | SS | |
| GBR (3) | 4-Mallety | Al | |
| | Bell Percussion * | Al | |
| | Red Note Ensemble / Tom Hunter | Al | |
| JPN (3) | Kuniko Kato | SS | |
| | Makoto Aruga Percussion Ensemble | ST | |
| | University of Tokyo –Lunason | Al | |
| BEL (2) | Koninklijk Conservatorium Brussel –RoGa Percussion | Al | |
| | RoGa Percussion * | Al | |
| BRA (2) | *Instituto Federal de Goiás* / Impact(o) / GruLaPe | SS | |
| | *Universidade Federal de Goiás* / Impact(o) | SS | |
| ESP (2) | Arxis Ensemble | Al | |
| | Neopercusión | ST | |
| DNK (2) | Copenhagen Percussion Ensemble | ? | |
| | Percurama / Gert Mortensen | SS | |
| MEX (2) | *Universidade de Guanajuato* / PercUG / Grupo de Percusión de Monterrey / Onix Ensamble / Academia Cervantina | Al | |
| | Tambuco | Al | |
| POL (2) | Sixen Group | ? | |
| | Warsaw Percussion Group | ? | |
| PRT (2) | Drumming | Al | |
| | Pedro Carneiro | Al | |
| SWE (2) | Gothenburg Percussion Group | Al | |
| | Kroumata Percussion Ensemble / Stockholm Percussion Ensemble –Grimus | DU | |
| ARG | *Teatro Colón* / Tambor Fantasma | Al | |
| AUT | Percussive Planet / Martin Grubinger | Al | |
| FIN | Echo Percussion /Sibelius Academy –Rudolph Percussion | Al | |
| GRC | Typana Percussion Ensemble | ? | |
| ITA | Brake Drum Percussion –UFIP | Al | |
| | | BR | |
| | | BZ | |
| | | Fe | |

***Tab. 10-1***. Cont.

| Country | Institution / Ensemble / Artist –Constructor | Metal | Bar profile |
|---|---|---|---|
| LVA | Perpetuum Ritmico Ensemble | Fe | |
| NOR | Norwegian Armed Forces' Band North | Al | |

**Legend:**

**Countries**

ARG – Argentina
AUS – Australia
AUT – Austria
BEL – Belgium
BRA – Brazil
CAN – Canada
CHE – Switzerland
DEU – Germany
DNK – Denmark
ESP – Spain
FIN – Finland
FRA – France
GBR – United Kingdom
GRC – Greece
ITA – Italy
JPN – Japan
LVA – Latvia
MEX – Mexico
NLD – Netherlands
NOR – Norway
POL – Poland
PRT – Portugal
SWE – Sweden
USA – United States

**Metal**

Al – aluminum
BR – brass
BZ – bronze
DU – duraluminum
Fe – iron
ST – steel
SS – stainless steel

**Complementary information**

***** – company that rents a Sixxen
**?** – information not founded

The data gathered here show thus that the number of Sixxens constructed worldwide could be represented by at least 87 prototypes. As highlighted by the table above, the ensembles and instruments cataloged so far are located in 24 countries (with greater prevalence in the USA–with twenty-five prototypes, followed by France with nine prototypes and Germany with six). In a previous discussion, Morais, Chaib, & Oliveira (2018) pointed to the existence of 60 Sixxens distributed in 21 countries. They did not consider many Sixxens, including many prototypes from the 1980s and 1990s, and the actual data representants a much more consistent and broad review.

The metal and bar profile aspects will be addressed soon, but it is perceptible that a great preponderance of Sixxens with inverted-U bar profiles made of aluminum is clear, as shown in Table 10-1. There is a significant presence in the USA, where 80% of the prototypes were made with these characteristics. This could be related to the only publication describing how to produce a Sixxen by Reed (2003). Brett Reed, a doctoral student of Steven Schick at the University of California San Diego (UCSD), published one of the most influential articles about the Sixxen, describing the model developed for Red Fish Blue Fish. Because this article was published in the Percussive Notes, a periodical with a broad diffusion in the percussion community, it may have highly influenced the large number of prototypes constructed in this country. The type of construction predominantly fits the prototype mainly suggested there, and the reasons are maybe numerous, as the author explained, being economical and practical the main ones. The author concluded, hoping "that these thoughts on building the sixxen will promote the construction of more sets for the purpose of performing 'Pleiades,' a work we are fortunate to have as a part of our repertoire." (Reed, 2003). It seems that it

effectively happened in the country with a certain homogeneity in the characteristics of construction.

It is perceptible in Table 10-1 that some prototypes are used by more than one group. The Sixxen constructed for Stony Brook University, e.g., is sometimes borrowed by the Juilliard Percussion Ensemble. The instrument constructed by Reed (2003) for the University of California San Diego and Red Fish Blue Fish was also used by Echoi Ensemble. The model constructed by Bergerault with Sylvio Gualda for Les Pléiades is constantly borrowed (by groups such as the percussion ensemble of the *Conservatoire de Saint Cloud*, of the *Orchestre National de France*, and Trio Xenakis). The same occurring yet with the Sixxen of the Percussion Art Quartet (borrowed sometimes by the *Hochschule für Musik und Theater München* for the *Ensemble für percussive Kunst München*) and the *Zürcher Hochschule der Künste* (used also by the groups Ensemble Arc-en-ciel and Cosmic Percussion Ensemble), among many other examples.

This table also highlights some unique instruments, such as those developed by Brake Drum Percussion (Italy) and Synergy Percussion, as previously described (Section 10.1.2). It also indicates some particular choices, such as the two Brazilian prototypes developed with an inverted-L profile (the same project that constructed two Sixxens for two different institutions) and the two prototypes constructed with round tubes (one for NMC and the other for the Makoto Aruga Percussion Ensemble). The table is also tremendously indicative of the groups that dedicate time, energy, and resources to develop more than one prototype, such as Les Percussions de Strasbourg (that constructed five prototypes with different constructors and with Xenakis all over the years), Sylvio Gualda that worked on two prototypes with Bergerault. Those cases indicate that the groups are more likely to stay with the same instrument over the years. The time to research, test, and finalize a Sixxen and all the material and financial resources required may discourage the musicians from changing for a new prototype. The groups generally construct their prototypes with the certitude that they would best represent their intentions. When an instrument is finished, it should have entirely fulfilled the group's wishes regarding their sound concepts, maximizing the initial investment. The number of groups using the same instruments also reinforces a certain maximization of using an already-produced prototype.

Some models are quite different and unique in the inventory of instruments constructed. They have very different particularities; however, they cannot be fully described in Table 10-1. Cassiopeia Sturm (USA), e.g., constructed two sixxens, one for her project composing *Meditations on the stars* and the other that would be used as a mechanized sixxen for one of her art installations (Fig. 10.32). The composer developed different microtonal instruments throughout her career, often with electronic components, and she has a very interesting production of installations. Thus, when constructing a sixxen, it seemed natural for her to imagine a mechanized sixxen. The prototype was constructed on

October 2013 and is part of Sturm's mechanized instrument research.

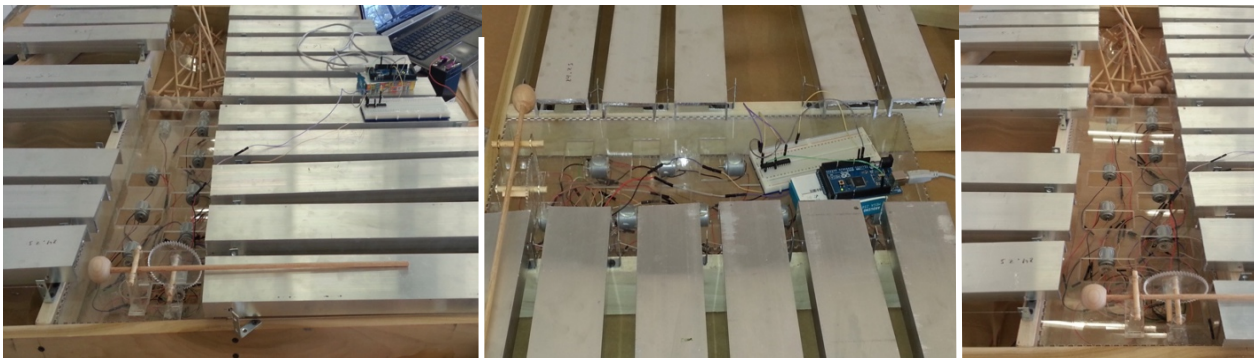


***Figure 10.32***. Details of the prototype of mechanized Sixxen constructed by Cassiopeia Sturm. Source: *https://thomas-digisketch.tumblr.com/post/65163147747/the-mechanical-sixxen-day-6-first-working.*

This unique achievement represents a great example of how the Xenakian instrument has been rethought and readapted to the composers' needs and specific projects. The transformation of its most basic characteristics as a form of musical experimentation was already standard for Xenakis. He imagined a performance with mechanized arms, and Sturm imagined a mechanized sixxen. The possibilities with the SIX-XEN are endless, and the data presented here seem to point to only the beginning of countless future realizations.

Table 10-1 also indicates constructors (only in the case of Sixxens produced by a company). It indicates thus that 20 Sixxens were produced by different companies and commercial interests, representing almost 23% of the prototypes. This is not negligible, but it becomes clear that most contributions occur through the engagement of percussionists individually and not necessarily by the industry. More will be addressed about it in Section 10.2.2, emphasizing the companies. To visualize all the previous information discussed and additional data gathered to describe these prototypes, consult Appendix 3.

With data prioritizing the type of metal as the primary information previously exposed, new aspects of the Sixxens appear. In Table 10-2, it is perceptible that most Sixxens have been constructed with bars made from aluminum and that there is some preference for the inverted-U profile without resonators, tubes, or pedals.

***Table 10-2***. Sixxen prototypes organized according to the type of metal and the particularities of construction.

| Metal | Country | Institution / Ensemble / Artist | Bar profile | S | P | R |
|---|---|---|---|---|---|---|
| Al (57) | USA (21) | Arizona State University | ■ | 2 | | |
| | | Baylor University / Line upon Line/Meehan–Perkins Duo | ■ | 2 | | |
| | | Cassiopeia Sturm | ■ | 1 | | |
| | | Chamber Cartel | ■ | 2 | | |
| | | Clocks in Motion | ■ | 1 / 2 | | |
| | | Crossing 32nd Street | ■ | 2 | | |
| | | Eastman School of Music | ■ | 1 | | |
| | | Joshua Dreyer | ■ | 1 / 2 | ■ | |
| | | Lagan Percussion | ■ | 2 | | |
| | | LA Percussion Rental * | ■ | 1 / 2 | | |
| | | Queens College – CUNY | ■ | 2 | | |
| | | Rowan University | ■ | 1 | | |
| | | SO Percussion / Meehan-Perkins Duo | ■ | 2 | | |
| | | Stony Brook University / Juilliard Percussion Ensemble | ■ | 2 | | |
| | | Talujon | ■ | 2 | | |
| | | Third Coast Percussion | ■ | 1 | ■ | |
| | | University of California San Diego / Red Fish Blue Fish | ■ | 2 | | |
| | | University of North Carolina at Greensboro | ■ | 2 | | |
| | | University of Tennessee Knoxville | ■ | 1 / 2 | | |
| | | University of Wisconsin Madison | ■ | 2 | | |
| | | Yale University | ■ | 2 | | |
| | DEU (5) | *Hoschchule für Musik Freiburg* | ■ | 2 | | |
| | | *Hochschule für Musik Frankfurt am Main* | ■ | 2 | | |
| | | *Hochschule für Musik Leipzig* | ■ | 2 | | |
| | | *Musikhochschule Lübeck* / MHL–Schlagzeugensemble | ■ | 2 | | |
| | | Schlagquartett Köln | ■ | 2 | | |
| | NLD (4) | Nieuwe Slagwerkgroep Amsterdam | ■ | 1 | | |
| | | Percussive Rotterdam | ■ | 2 | | |
| | | Slagwerk Den Haag | ■ | 2 | | ■ |
| | | Tromp Laureates | ■ | 2 | | |
| | AUS (3) | Nova Ensemble | ■ | 2 | | |
| | | Synergy Percussion Group | ■ | 2 | | ■ |
| | | Taikoz | ■ | 1 / 2 | | ■ |
| | CAN (3) | NYO Canada / Wilfrid Laurier University | ■ | 2 | | |
| | | Sixtrum | ■ | 2 | | |
| | | TorQ Percussion Quartet | ■ | 2 | | |
| | CHE (3) | *Centre International de Genève* / Eklekto / Usine Sonore | ■ | 2 | | |
| | | Decibells | ■ | 2 | | |
| | | Lunason * | ■ | 2 | | |
| | GBR (3) | 4-Mallety | ■ | 1 / 2 | | |
| | | Bell Percussion * | ■ | 1 / 2 | | |
| | | Red Note Ensemble / Tom Hunter | ■ | 2 | | |
| | BEL (2) | Koninklijk Conservatorium Brussel | ■ | 1 / 2 | | |
| | | RoGa Percussion * | ■ | 1 / 2 | | |
| | FRA (2) | Les Pléïades & Sylvio Gualda (I) | ■ | 1(**C**) | ■ | |
| | | Les Pléïades & Sylvio Gualda (II) | ■ | 2 | ■ | ■ |
| | MEX (2) | Universidade de Guanajuato | ■ | 2 | | |
| | | Tambuco | ■ | 2 | | |
| | PRT (2) | Drumming | ■ | 2 | | |
| | | Pedro Carneiro | ■ | 2 | | |

***Tab. 10-2***. Cont.

| Metal | Country | Institution / Ensemble / Artist | Bar profile | S | P | R |
|---|---|---|---|---|---|---|
| (Al cont.) | ARG | *Teatro Colón* / Tambor Fantasma | | 1 / 2 | | |
| | AUT | Percussive Planet / Martin Grubinger | | 2 | | |
| | ESP | Arxis Ensemble | | 2 | | |
| | FIN | Echo Percussion / Sibelius Academy | | 2 | | |
| | ITA | Brake Drum Percussion | | 2 | | |
| | JPN | University of Tokyo | | 2 | | |
| | NOR | Norwegian Armed Forces' Band North | | 1 / 2 | | |
| | SWE | Gothenburg Percussion Group | | 2 | | |
| SS (7) | BRA (2) | *Instituto Federal de Goiás* (IFG) / Impact(o) | | 1 | | |
| | | *Universidade Federal de Goiás* (UFG) / Impact(o) | | 1 | | |
| | JPN (2) | Kuniko Kato | | 2(**C**) | | |
| | | Les Percussions de Strasbourg IV | | – unfinished – | | |
| | CHE | *Zürcher Hochschule der Künste* | | 2 | | |
| | DNK | Percurama / Gert Mortensen | | 2 | | |
| | USA | Oberlin College | | 2 | | |
| ST (6) | AUS (2) | University of Melbourne | | 1 | | |
| | | University of Western Australia | | 2 | | |
| | | Synergy Percussion Group | | 2 | | |
| | CAN | NMC / Nexus | | 2 | | |
| | ESP | Neopercusión | | 2 | | |
| | JPN | Makoto Aruga Percussion Ensemble | | 1 | | |
| Fe (5) | AUS | Synergy Percussion Group | | 2 | | |
| | DEU | Percussion Art Quartet | | 2 | | |
| | ITA | Brake Drum Percussion | | 2 | | |
| | LVA | Perpetuum Ritmico Ensemble | | 2 | | |
| | USA | University of Texas at Austin | | 1 / 2 | | |
| BR (3) | FRA (2) | Les Percussions de Strasbourg I | | 1(**V**) | | |
| | | Les Percussions de Strasbourg II | | 2 | | |
| | ITA | Brake Drum Percussion | | 2 | | |
| DU (3) | FRA (2) | Les Percussions de Strasbourg III | | 2 | | |
| | | Les Percussions de Strasbourg V | | 2 | | |
| | SWE | Kroumata Percussion Ensemble | | 2 | | |
| BZ | ITA | Brake Drum Percussion | | 2 | | |
| ? (8) | FRA (2) | *Conservatoire de Lyon* | | | | |
| | | Symblema Percussions | | | | |
| | POL (2) | Sixen Group | | | | |
| | | Warsaw Percussion Group | | 2(**C**) | | |
| | USA (2) | Garrett Mendelow | | | | |
| | | Jacaranda Percussion Ensemble | | | | |
| | DNK | Copenhagen Percussion Ensemble | | | | |
| | GRC | Typana Percussion Ensemble | | | | |

**Legend: Countries**

ARG – Argentina
AUS – Australia
AUT – Austria
BEL – Belgium
BRA – Brazil
CAN – Canada
CHE – Switzerland
DEU – Germany
DNK – Denmark
ESP – Spain
FIN – Finland
FRA – France
GBR – United Kingdom
GRC – Greece
ITA – Italy
JPN – Japan
LVA – Latvia
MEX – Mexico
NLD – Netherlands
NOR – Norway
POL – Poland
PRT – Portugal
SWE – Sweden
USA – United States

**Metal**

Al – aluminum
BR – brass
BZ – bronze
DU – duraluminum
Fe – iron
ST – steel
SS – stainless steel

**Complementary information**

***** – company renting a Sixxen
**?** – information not founded

**S** – spatial disposition of bars
**P** – presence of pedal
**R** – presence of resonators

**V** – vertical disposition
**C** – continuous layout

Looking at the information in Table 10-2, it is visible the diversity of possible combinations and results. In quantitative terms, aluminum is the metal more implied (used in 64% of the Sixxens here described), followed by stainless steel (8%), steel (7%), iron (6%), brass (3%), duraluminum (3%), and bronze (1%). The profiles are markedly more represented by inverted-U with unequal sides (used in 51% of the Sixxens), followed by a flat bar (16%), square tube (12%), inverted-U with equal sides (6%), rectangular tube (3%), round tube (2%), and inverted-L (2%). In terms of the disposition of the bars, the horizontal type with two surfaces is predominant (64% of the prototypes), followed by the prototypes that can be adapted with one or two surfaces (14%) and with one surface (12%). The vertical disposition of bars is uncommon (1%), and the continuous layout of the bars is rare, occurring only in 3% of the prototypes.

Regarding the pedal and dampening mechanism, only 13% of the prototypes were developed to have it. As previously presented in Section 10.1.4, this little occurrence of pedal mechanisms could be explained by the absence of pedaling indication in *Pléïades* but also by an interest in a production that has no additional costs in financial terms or requires less time to be developed. A mechanism to activate the resonance dampening can be very costly and requires many tests to ensure the system works, all of which add to extra costs. Regarding the presence of resonators (tubes or boxes to amplify the frequencies and resonances) in Table 10-2, only 7% present some structure to stimulate it.

Even if some tendencies are clear (higher prevalence of aluminum bars with inverted-U of unequal sides as profile, without pedal and resonators), the vast number of different prototypes tends to equally indicate, as a consequence, enormous differences in terms of timbres, range, and amplitude. It is also important to point out that even the Sixxens constructed with the same material could present different sizes, dimensions, and proportions, manifesting substantial differences in the frequencies, range, final timbre and global sonority. Doing an acoustic analysis of only twelve prototypes, Ceuster (2021) points to some aspects of this diversity. The author thus presented many elements that corroborate previous expectations about it (as mentioned by Morais, Chaib, & Oliveira, 2018) and concluded that “Each element of the instrument, no matter how small, impacts the intelligibility of the separate streams.” (Ceuster, 2021, p. 96). This is a fundamental point in Xenakis’ constant reiteration of the openness of the SIX-XEN, excluding a unique prototype that has to be imitated and that would include all of his own choices.

### 10.2.2 Companies that worked for the construction of a Sixxen

Xenakis’ point of view about producing musical instruments (industrial or not) was discussed in Chapter 3–Section 3.1.4. A broader perspective will be discussed here, including companies that did not exchange with the composer about his instrument. The primary approach is to try to

understand how this sector incorporated the instrument and to what extent this could be of interest to large-scale production. Heretofore, at least fourteen companies were somehow involved in the production of a Sixxen (Bell Percussion, Bergerault, Giannini Swiss Drums, Grimus – Robert Hébrard, Kolberg, L.A. Percussion Rental, Lunason, Pustjens Percussion Products, *Rythmes et Sons*, RoGa Percussion, Rudolph Percussion, Thinktone, UFIP, and Yamaha), indicated here in Table 10-3.

***Table 10-3***. Companies that worked to construct a Sixxen (by the decade of production and type of contact with Xenakis).

| Decade | Country | Company | Metal | Bar profile | Spatial disposition | P | |
|---|---|---|---|---|---|---|---|
| 1970s | DEU | Kolberg **(IX)** | BR | | 1 (**V**) | | |
| | DEU/FRA | Kolberg/*Rythmes et Sons* **(IX)** | BR | | 2 | | |
| 1980s | FRA | Bergerault **(IX)** | Al | | 1(**C**) | | |
| | | Grimus – Robert Hébrard **(IX)** | DU | | 2 | | |
| | JPN | Yamaha **(IX)** | SS | | ———unfinished——— | | |
| | NLD | Pustjens Percussion Products **(≈IX)** | Al | | 1 | | |
| 1990s | FRA | Bergerault **(IX)** | Al | | 2 | | |
| | ITA | UFIP **(≈IX)** | Al | | 2 | | |
| | | | BR | | | | |
| | | | BZ | | | | |
| | | | Fe | | | | |
| 2010s | BEL | RoGa Percussion | Al | | 1 / 2 | | |
| | CHE | Giannini Swiss Drums | SS | | 2 | | |
| | | Lunason | Al | | 2 | | |
| | GBR | Bell Percussion | Al | | 1 / 2 | | |
| 2020s | FIN | Rudolph Percussion | Al | | 2 | | |
| | FRA | *École d'Arts et Métiers* (Metz) / Thinktone / *Rythmes et Sons* **(→IX)** | DU | | 2 | | |
| | USA | LA Percussion Rental | Al | | 1 / 2 | | |

**Legend:**

**Country**
BEL – Belgium
CHE – Switzerland
DEU – Germany
FIN – Finland
FRA – France
GBR – United Kingdom
ITA – Italy
JPN – Japan
NLD – Netherlands
USA – United States

**Metal**
Al – aluminum
BR – brass
BZ – bronze
DU – duraluminum
Fe – iron
SS – stainless steel

**Complementary information**
**(IX)** – with direct collaboration with Xenakis
**(≈IX)** – based on exchanges with Xenakis
**(→IX)** – based on a model developed with Xenakis

**C** – continuous layout of the bars
**P** – presence of pedal mechanism
**R** – presence of resonators
**V** – vertical disposition of the bars

From those companies, seven could still offer their acquisition through an order (Bell Percussion, Giannini Swiss Drums, LA Percussion Rental, Lunason, *Rythmes et Sons*/Thinktone, RoGa Percussion, and Rudolph Percussion), some of them also offering instrument rental (Bell

Percussion, LA Percussion Rental, Lunason, *Rythmes et Sons*/Thinktone, and RoGa Percussion).

In terms of the type of metal, there is again some predominance of aluminum (representing 50%), followed by brass (17%), duraluminum (11%), stainless steel (11%), and bronze and iron (5,5% each). Concerning the profiles, there are fewer profiles used by these companies when compared with the broader overview (only four), and the inverted-U with unequal sides and the flat bar are predominant (with 39% of presence among the prototypes). Yamaha (Japan) was also included here because they worked directly with the composer trying to achieve a new Sixxen for Les Percussions de Strasbourg. However, this project was unfinished, and they never presented the final product. The exchanges that were established were previously mentioned (Chapter 9–Subsection 9.1.1.3), and they indicated how far the project arrived, having even established the specific metal and the profile of the bars with the construction of, at least, one sixxen to test with Xenakis and Les Percussions de Strasbourg.

The percussionists are essentially guided by their personal and aesthetic interests, previous experiences, and possible experiments with metals in different occasions to choose a specific alloy that could represent a personal ideal sound to Xenakis' piece. Those choices have direct implications in the timbre and sound qualities of the final Sixxen and carry in themselves the signature of the sound and concepts of the ensemble about *Pléïades*.

The general overview here indicates how predominant the artisanal production of Sixxens is and how important this approach is for the perpetuation of the Xenakis instrument. Even if the composer participated in different processes inherently tied with major companies, percussionists' personal and artistic engagement has completely changed the panorama of its current scattering, making it possible for the object to be considered an established instrument. Paying attention exclusively to what Xenakis directly worked on, it turns clear that the composer stimulated diverse metallic materials, profiles, and disposition of bars. He was thus not trying to achieve a unique and exclusive type of Sixxen, at the opposite, he contributed to a varied instrument presentation.

It is thus clear that the ensemble that decides to play Xenakis' work, in most cases, participates in the process of construction of its instrument and particular sounds. They end up contributing with a whole Xenakian perspective on sound and music making, based on his open-concept instrument and the inherent inclusiveness of his approaches. More than constructing the instrument, these ensembles also commissioned and developed a whole repertoire for it, which will be discussed in the next chapter.

# Chapter 11. Repertoire for the SIX-XEN

Harry Partch (1974, p. 194) stated, "Music systems are made valid–and workable–by significant music, as these pages have so frequently sought to remind us," showing how important composition was for him in the processes of validation. It is also clear that Partch was referring to the tuning systems and the compositional approaches required and, by direct inference, the instruments that make them possible to be heard, appreciated, and understood. Thus, tuning systems, compositional approaches, esthetic choices, and musical instruments have a direct connection when formalized by the repertoire that is allowed by their possibilities and limits and created as a consequence.

Iannis Xenakis stated many times in the same direction, and, as discussed in Chapter 4, he tried to insert the SIX-XEN in many projects he created (and many more he would have created if it was possible). However, he knew that the instrument would not be limited to him and his production. In 1993, he wrote to Philippe Manoury, that was trying to find some funding for a project that would construct a new Sixxen (or a series of the same). Xenakis then stated:

> I think, indeed, that it becomes rather urgent to take care of the construction of one (or even several) sets, because when the one of the Percussions de Strasbourg poses problems due to transport or ageing, there will be no more possibility to play the pieces written for these instruments.
> On the other hand, the richness of the sound of these new instruments would be likely to interest many composers. If a set were to be available in the Percussion Pool, this would promote a wider dissemination of the existing repertoire and would also allow the creation of new works. [underline added][1] (Iannis Xenakis, mail to Philippe Manoury, June 25, 1993).

Conscious that his instrument would perdure if more prototypes were available, Xenakis was conscious that the interest in the SIX-XEN sonorities would motivate other composers. He was also confident that not only the composers would have an interest, but the ensembles that would construct a Sixxen would stimulate new commissions. Both cases turned out to be correct because many groups that constructed it to play *Pléïades* (1978) ended up expanding the repertoire for the instrument. It will be thus discussed here how literature using sixxens has been incremented all over time, showing other composers who wrote for the instrument and how they applied it to their own compositional approaches.

Previous considerations about the SIX-XEN repertoire were presented by Morais, Chaib, & Oliveira (2020) and Morais & Araújo (2018). While the first article produced a general overview of

[1] "Je pense, en effet, qu'il devient assez urgent de s'occuper de la construction d'un ( voire de plusieurs ) jeux, car lorsque celui des Percussions de Strasbourg posera des problèmes dus au transport ou au vieillissement, il n'y aura plus de possibilité de jouer les pièces écrites pour ces instruments. / D'autre part, la richesse sonore de ces nouveaux instruments serait susceptible d'intéresser bon nombre de compositeurs. Dans le cas où un jeu serait disponible au pool de Percussions, serait favorisée une plus large divulgation du répertoire déjà existant et cela permettrait également la création d'œuvres nouvelles." (Iannis Xenakis, mail to Philippe Manoury, June 25, 1993).

the repertoire, the latter focused on the repertoire that interacts specifically with electroacoustic music. In order to obtain information about the repertoire of interest here, a wide range of sheet music reviews and document research was employed, as well as exchanges with composers and musicians to get to the data presented. As will be discussed here, the results surpass the previous expectations and overviews (including pieces the previous authors should have noticed but had no access to).

This chapter will first present a broad overview of the repertoire using a Sixxen, establishing a more quantitative approach to its characteristics. After that, the notation developed after Xenakis will be summarily described. Finally, a discussion of recordings with this instrument, including specific data on recordings of *Pléïades* and about post-*Pléïades* repertoire as a whole.

## 11.1 A large overview

The discussion about the repertoire using Sixxen was previously addressed, focusing only on Xenakis' production, including even unfinished pieces and projects on which the composer imagined his instrument[2]. Now a broader approach will be presented, including different composers and pointing to different perspectives that included the Xenakian instrument. In this regard, the present research verified a total of 110 post-*Pléïades* works of 78 composers, distributed in 19 countries (Table 11-1), starting in 1978, with productions until the end of 2022. Morais, Chaib, & Oliveira (2020) exposed 46 pieces by 43 composers from 11 countries in a review that was realized until 2017. They did not mention many works, even if they were composed before 2017.

After the first work written at the end of the 1970s, it is noticed that the following decade (1980-89) is essentially characterized by two new works (one of them still being produced by Xenakis and not strictly using Sixxen). The new work by the composer (*Idmen A B*, 1985) is separated seven years from the first one, and the second composer, Philippe Manoury, started to work with Sixxen almost ten years after its creation. Manoury would thus write a new piece dedicated to Les Percussions de Strasbourg, *Le livre des claviers* (1987-1988) and was interested in the instrument's sonorities that, for this purpose, he made a broad spectral and timbre analysis of the Sixxen of the group.

[2] As addressed in Chapter 4.

***Table 11-1***. Repertoire for Sixxen from 1978 to 2022. The information is organized by year of composition and shows data on the composer, the instrumentation, and the length of time.

| Year | Title | Composer (Country) | Length |
|---|---|---|---|
| 1978 | *Pléïades* | Iannis Xenakis | 48’ |
| 1985 | *Idmen A B* | Iannis Xenakis | 10’ |
| 1987-1988 | *Le livre des claviers* («*III*», «*VI*») | Philippe Manoury (FRA) | 3’, 6’40” |
| 1990 | *Khnoum* | François-Bernard Mâche (FRA) | 16’30” |
| 1993 | *Junkelan* | David Pye (AUS) | 35’ |
| | *L’Estuaire du temps* | François-Bernard Mâche (FRA) | 29’ |
| 1994 | *Et la pluie se mit à tomber* | Annette Schlünz (DEU) | 13’51’’ |
| | *Sechse kommen durch die Welt* | Lutz Glandien (DEU) | 15’ |
| 1995 | *Métal* | Philippe Manoury (FRA) | 25’ |
| 1996-1997 | *Music of Mercy Pt.3* | Peter Adriaansz (USA) | 18’ |
| 1998 | *Interregna* | Mark Osborn (USA) | 9’30” |
| | *Los* | Jean-Marc Chouvel (FRA) | ? |
| | *Sol* | Jean-Marc Chouvel (FRA) | 5’ |
| 1999 | *Sous-développement mental, hommage à mon pays* | Harold Vasquez Castañeda (COL) | ? |
| 2000 | *Home organs* | Thomas Meadowcroft (AUS) | 12’20” |
| | *Journey of the Magi* | James Wood (GBR) | 18’ |
| 2001 | *Access* | Claudio Baroni (ARG) | ? |
| | *Répliques* | Jean-Louis Agobet (FRA) | 12’ |
| 2002 | *The Drummers of Gilgamesh* | David Pye (AUS) | ? |
| 2003 | *Envoûtements VI* | Suzanne Giraud (FRA) | 17’ |
| 2004 | *à.X.* | Daniel A. Weymouth (USA) | 13’ |
| | *Shadowtime* | Brian Ferneyhough (USA) | 120’ |
| 2005 | *Adygea* | Klank Ensemble (PRT) | ? |
| | *Ghodoberis* | Klank Ensemble (PRT) | ? |
| | *Payoniiya-tsuro* | Klank Ensemble (PRT) | ? |
| | *Senza* | François Paris (FRA) | 10’ |
| | *Talyshes* | Klank Ensemble (PRT) | ? |
| | *Udmurtia* | Klank Ensemble (PRT) | ? |
| | *Waves To Be Beaten, Conquer The Horizon* | Erik Daelhin (NOR) | 8’ |
| | *Zzyzx* | Klank Ensemble (PRT) | ? |
| 2006 | *Steel Factory* | Luís Tinoco (PRT) | 10’40” |
| | *Toy* | Oscar Strasnoy (ARG) | 15’ |
| 2007 | *Le petit bossu* | James Wood (GBR) | 40’ |
| | *Les Arpenteurs* | François Paris (FRA) | 90’ |
| 2007-2008 | *Feedback* | Marco-Antonio Perez-Ramirez (CHL) | 17’ |
| | *Cloc Ar Y Dwr* | Jack White (GBR) | 11’44” |

***Tab. 11-1***. Cont.

| | | | |
|---|---|---|---|
| 2009 | *ICO* | Wolf Edwards (CAN) | 10’15” |
| | *Trigger/Switch/Filter* | Alex Mincek (USA) | ? |
| 2010 | *beat* | Sylvain Pohu (CAN) | 11’40” |
| | *Communio: Pascha Nostrum Immolatus Est Christus* | Martin Grubingen (AUT) | 5’21” |
| | *Psappha, a personal take* | Enrico Bertelli (ITA) | 14’ |
| | *Venus* («*Morning star*») | Rozalie Hirs (NLD) | 9’33” |
| | *X-trum* | Fabrice Marandola (FRA) | 6’ |
| 2011 | *Obsolve* | Sam Britton–alias Isambard Khroustaliov (GBR) | 6’51” |
| | *Talea (2nd version)* | François Sarhan (FRA) | 7’35” |
| 2011-2012 | *Étoile* | Friedrich Cerha (AUT) | 23’ |
| | *S(c)enario* | Flo Menezes (BRA) | 23’ |
| 2012 | *De l’itération* | Philippe Leroux (FRA) | 20’ |
| | *Digression* | Nicolas Tzortzis (GRC) | 8’ |
| | *Intermetallic* | Amanda Cole (AUS) | 14’35” |
| | *1, 3, 6, 10…* | Giovanni Damiani (ITA) | 30’ |
| 2013 | *Adelaide* | Kristina Warren (USA) | 5’ |
| | *Beauty will be amnesiac or will not be at all* | Anthony Pateras (AUS) | 60’ |
| | *Etched in sand* | Nina C. Young (USA) | 9’ |
| | *Lachez tout! / Enough already* | François Sarhan (FRA) | 70” |
| | *Le rêve d’Ahmed* | Serge Provost (CAN) | ? |
| | *Valle-Einstein (omaggio ad Albert Einstein)* | Giovanni Damiani (ITA) | variable |
| 2014 | *An exploration of bright* | Marc Yeats (USA) | 18’ |
| | *Four meditations on the stars* | Cassiopeia Sturm (USA) | 10’21” |
| | *Intonarumori* | Devon Yasamune Toyotomi (USA) | ? |
| | *Mechanical ghosts* | Anthony Donofrio (USA) | 17” |
| | *Microtonal Christmas - Carol of the Sixxen* | Clocks in Motion (USA) | 6’ |
| | *Night* | Ben Davis (USA) | 10’ |
| | *No. 56 Scala II* | Peter Adriaansz (USA) | 25’ |
| 2015 | *After the Zooids* | Melody Eötvös (AUS) | 1’30” |
| | *Day* | Ben Davis (USA) | 31’ |
| 2016 | *A strange manuscript found in a copper cylinder* | Melody Eötvös (AUS) | 20’ |
| | *Cinemusica - Two Movements for Percussion & Strings* | Timothy Constable (NLD) | 10’ |
| | *Breaking the news* | Isaac Pyaat (USA) | 7’20” |
| | *Estudo para Sixxen* | Estércio Marques (BRA) | 6’ |
| | *Música para Trompa e Sixxen* | Estércio Marques (BRA) | 10’20” |
| | *Time in transcendence* | Joseph Koykkar (USA) | 12’20” |

***Tab. 11-1***. Cont.

| | | | |
|---|---|---|---|
| 2017 | *After Spring* | Michelle Agnes (BRA) | 15’20” |
| | *Intra (Intermetamorphosis)* | Mark Fell (GBR) | 35’55” |
| | *Sededinrondos* | Carlos dos Santos (BRA) | ? |
| | *Metal music* | Garth Paine (AUS) & Simone Mancuso (ITA) | 9’40” |
| | *Quartered* | Ryan Lott (USA) | 25’ |
| | *Sky, Let the Rain Fall* | Sandy Evans (AUS) | 10’ |
| | *Whiplash* | Stéphane Magnin (FRA) | 33’ |
| 2018 | *Dance of the Sixxen - Plum Fairy* | Daniel Morphy (USA)–Arr. | 2’40’’ |
| | *Dans les pas de la main* | Augustin Braud (FRA) | 13’36” |
| | *Frame* | Domenico Melchiorre (CHE) | 11’ |
| | *On the Passage of a Few Ants Through a Rather Brief Unity of Time* | Nicola Deane (GBR) | 13’32” |
| | *Protomusic* | Mark Fell (GBR) | variable |
| 2019 | *Incircles* | Domenico Melchiorre (CHE) | 25’ |
| | *Frammenti* | Domenico Melchiorre (CHE) | 25’ |
| | *Niyama* | Domenico Melchiorre (CHE) | 17’56” |
| | *Black Dino* | Bendik Hovik Kjeldsberg–alias Bendik HK (NOR) | 7’34” |
| | *Dark Green 51* | Bendik Hovik Kjeldsberg–alias Bendik HK (NOR) | 5’40” |
| | *Glacier Blue Skylark* | Bendik Hovik Kjeldsberg–alias Bendik HK (NOR) | 5’52” |
| | *Grey E Master* | Bendik Hovik Kjeldsberg–alias Bendik HK (NOR) | 5’ |
| 2019-2020 | *Epicentre: Seismic Construction in 3 Parts* | Johannes Maria Staud (AUT) | 16’ |
| 2020 | *Sphaira* | Domenico Melchiorre (CHE) | 6’ |
| | *@HOME - 1 - Contact* | Les Percussions de Strasbourg (FRA) | 4’ |
| | *Sora* | Gérard Langella–alias Mr Untel (FRA) | 4’42” |
| | *Kaiyō* | Gérard Langella–alias Mr Untel (FRA) | 4’58” |
| 2019-2021 | *Theta Carinae* | Bertrand Gourdy (FRA) | 16’ |
| 2021 | *Samsa* | Domenico Melchiorre (CHE) | 20’ |
| | *Chiffren* | Domenico Melchiorre (CHE) | 28’ |
| | *Seven* | Anna Sowa (POL) | 5’ |
| | *theôrìa α* | Charles David Wajnberg (FRA) | 20’30” |
| | *Σχίζειν–Schizein* | Daphné Hejebri (FRA) | 7’20” |
| | *Um* | Gitbi Kwon (KOR) | 11’40” |
| | *Path* | Michelle Agnes Magalhães (BRA) | 8’ |
| | *Country & Gamelan #5* | Thomas Meadowcroft (AUS) | variable |
| | *Slow, Text, Fast* | Zacarias Maia (BRA) | 7’20” |
| | *One Direction* | Zacarias Maia (BRA) | 2’40’’ |

***Tab. 11-1***. Cont.

| | | | |
|---|---|---|---|
| 2022 | *Aisling* | Domenico Melchiorre (CHE) | 20’ |
| | *Jeux d’ondes pour six Sixxens* | David Chalmin (FRA) | ? |
| | “*Nouvelle œuvre pour Sixxen*” | Ensemble Contrechamps (CHE) | ? |

**Legend:**

**Countries**

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COL – Colombia
DEU – Germany
FRA – France
GBR – United Kingdom
GRC – Greece
ITA – Italy
KOR – South Korea
NLD – Netherlands
NOR – Norway
POL – Poland
PRT – Portugal
USA – United States

**Complementary information**

? – Information not founded

After Manoury’s work, François-Bernard Mâche, another friend of Xenakis, would compose *Khnoum* (1990) using the SIX-XEN as a commission of Les Percussions de Strasbourg. This fact shows the immediate circle of contacts of the composer and the French percussion ensemble as responsible for the expansion of the initial repertoire. Mâche would also record the instrument for two main reasons: broadly analyzing its characteristics and, more importantly, sampling its sonorities. He would then use these sound samples in *L’Estuaire du temps* (1993) for soloist and orchestra.

If the previous decades show just a first establishment of the repertoire and a minimal production (staying mainly attached to Xenakis’ circle of friends and commissions by Les Percussions de Strasbourg), the decade 1990-99 is characterized by an increase in the number of works (11 works, 10% of the total) and composers interested. It is thus clear that the data presents a constant increase in the decade 2000-2009 (24 works–22% of the total) and 2010-2019 (53 works–48%), with a promising beginning in the first fourth of the actual decade 2020-2022 (19 works–17%). The data thus shows an exponential growth related to the number of pieces composed (Fig. 11.1).

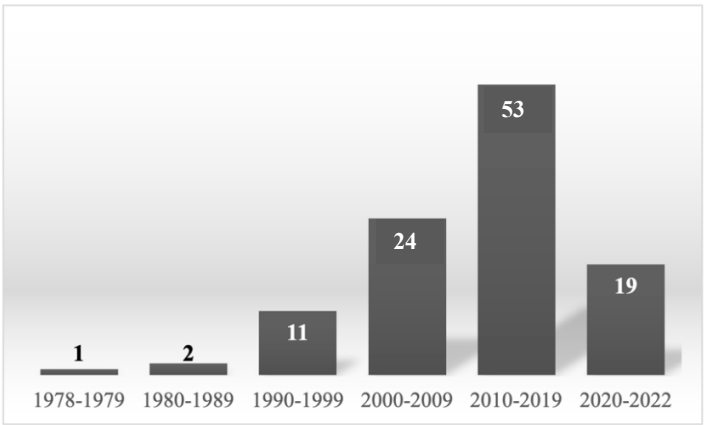


***Figure 11.1***. Graphic of the increase in pieces using Sixxen by decade showing the initial forty years of development.

Only the three years considered in the current decade (2020-2022) already represent 35% of the repertoire composed in 2010-2019, showing that it could exceed the previous rates and maintain the exponential characteristics of the entire period. Morais, Chaib, & Oliveira (2020) highlighted the same phenomenon and the current work confirm and complements their expectations. The constant increase can be explained by the proportional increase in the number of ensembles that built Sixxens[3] and started working directly with other composers. Although it has taken almost ten years for another composer to write for a Sixxen, the demand for new works seems to be characterized by a very pronounced and noticeable upward curve in the data gathered here.

The largest number of pieces were produced by French composers (23 compositions–21% of the total), from the USA (19 compositions–18%), and from Australia (with ten works–9%). Other countries are also mentioned as Brazil and Switzerland with eight compositions each (8 works–7%), Portugal and the United Kingdom (7 works), Norway (5 works), Italy (4 works), Austria and Canada (3 works), Netherlands, Germany, and Argentina (2 works), besides Chile, Colombia, South Korea, Poland, and Greece (with one work each). The largest number from France and USA can be related to the fact that those countries are those with a large number of prototypes (Chapter 10–Section 10.2.1), reinforcing the fact that the growth of prototypes constructed increases the repertoire dedicated explicitly to it. For the data found in France, it is also necessary to consider that the prototype was built by an important ensemble of creation that constantly works with many composers. Thus, the time factor and perseverance have an influence, but more than that, the fact that Les Percussions de Strasbourg is an extremely engaged group for the commissioning of new works and for directly working with composers is primordial.

Many composers worked more than one time with a Sixxen, but the tendency stays quite the same as previously indicated for the quantity of pieces, with France and the USA (17 composers or 23% each), as well as Australia (6 composers or 8%) concentrating the largest number of composers. The exception to the correlation between the number of pieces and of composers by country is characterized by Switzerland and Norway because they present each only one composer. Both countries present great productivity, but they present little diversity of composers. In this way, e.g., the composer that contributed with the largest number of pieces was Domenico Melchiorre (with eight pieces), contributing alone to the fourth position of Switzerland in terms of pieces. However, the country has only him representing the composers interested in work with SIX-XEN.

Table 11-1 is expanded in Appendix 4 showing more data, whether published or not and which ensemble commissioned them. Based on the information organized and presented there, it is clear

[3] As shown in Chapter 9 and confronted with the data presented in Chapter 10.

that 34% of the works listed here are edited and are available via the websites of the publishers themselves, online shops, or others. However, 13% are not notation based, and most, 53% of the scores, were not yet published and can be obtained through direct request to the composers or through availability on their websites.

The Appendix 4 also shows an interesting phenomenon: the direct collaboration with percussion ensembles and the importance of the commissions in developing the SIX-XEN repertoire. Thus, 81% of the repertoire results from commissions, and 78% of the repertoire is directly tied to a specific percussion ensemble. Thus, from 22 ensembles or institutions that commissioned new pieces with Sixxen, 19 groups from 11 countries were percussion ensembles. Thus, these musicians are the fundamental element in the production of the repertoire. Among these it can be mentioned: Les Percussions de Strasbourg (France) with 23 works dedicated to them, DeciBells (Switzerland) and Sixtrum (Canada) with seven works each, Clocks in Motion (USA), and Klank Ensemble (Portugal) with six works, Synergy (Australia) with five works, Impact(o) (Brazil) and Slagwerk Den Haag (Netherlands) with four works, Drumming (Portugal) with three works, Chamber Cartel (USA), Nova Ensemble (Australia) and Percussive Planet (Austria) with two works, as well as Collectif Contre-champs (Switzerland), Red Fish Blue Fish (USA), Taikoz (Australia), Third Coast (USA), TorQ (Canada) and Trio Xenakis (France) with one new commission each. The clear association of those groups with various composers and their commitment to new music makes the data significant for the respective countries. With this list, the contributions of the current project acquire new contours. Having resulted in 9 pieces, the contributions premiered during or composed for the four concerts described in Chapter 8 constitute an intense production for 2021 (also representing almost half of what was produced between 2020 and 2022).

The data presented here is similar to what Morais, Chaib, & Oliveira (2020) presented. However, something also seems to have fundamentally changed. Here it seems clear that many groups mainly concentrated a lot of compositions (Decibells, Bendik HK, and the present project) in a short period of time. While the groups previously cumulated pieces progressively in a more spaced period, they seem to present a tendency to have a more concentrated production associated with more pieces commissioned in a short period. Analyzing specifically the instrumentation required by the pieces described (Table 11-2), one can see that the percussion ensemble has, once again, more pieces composed (66 pieces which represent 60% of the total repertoire with Sixxen) than the mixed ensemble (with 25 pieces–23%), percussion ensemble associated with other instrument(s) (with 13–12%) and works for soloist (with 4–4%). Considering the categories classified as percussion ensemble with or without other instrument(s) and percussion soloist, it is perceptible that 76% of the repertoire is mainly associated with the percussion community and their specific instruments.

***Table 11-2***. Repertoire for Sixxen from 1978 to 2022, organized by the type of required ensemble and year of composition.

| Type | Category | Instrumentation | Title (Year)–Composer (Country) |
|---|---|---|---|
| **Percussion ensemble** (66) | sextet (41) | Sixxen (13) | *Pléïades* (1978)–Iannis Xenakis |
| | | | *Le livre des claviers* (1987-1988)–P. Manoury (FRA) |
| | | | *Sechse kommen durch die Welt* (1994)–Glandien (DEU) |
| | | | *Métal* (1995)–Philippe Manoury (FRA) |
| | | | *Los* (1998)–Jean-Marc Chouvel (FRA) |
| | | | *Répliques* (2001)–Jean-Louis Agobet (FRA) |
| | | | *Intonarumori* (2014)–Devon Y. Toyotomi (USA) |
| | | | *Estudo para Sixxen* (2016)–Estércio Marques (BRA) |
| | | | *Sededinrondos* (2017)–Carlos dos Santos (BRA) |
| | | | *Σχίζειν–Schizein* (2021)–Daphné Hejebri (FRA) |
| | | | *Jeux d'ondes* [...] (2022)–David Chalmin (FRA) |
| | | (Sixxen and tape) | *Venus («Morning star»)* (2010)–Rozalie Hirs (NLD) |
| | | | *Seven* (2021)–Anna Sowa (POL) |
| | | with 2 sixxens (8) | *Senza* (2005)–François Paris (FRA) |
| | | | *Trigger/Switch/Filter* (2009)–Alex Mincek (USA) |
| | | | *Étoile* (2011-2012)–Friedrich Cerha (AUT) |
| | | | *De l'itération* (2012)–Philippe Leroux (FRA) |
| | | | *Digression* (2012)–Nicolas Tzortzis (GRC) |
| | | | *Etched in sand* (2013)–Nina C. Young (USA) |
| | | (with 2 sixxens and live electronics) | *Le rêve d'Ahmed* (2013)–Serge Provost (CAN) |
| | | (with 2 sixxens and tape) | *Les Arpenteurs* (2007)–François Paris (FRA) |
| | | with Sixxen (10) | *Interregna* (1998)–Mark Osborn (USA) |
| | | | *Sol* (1998)–Jean-Marc Chouvel (FRA) |
| | | | *ICO* (2009)–Wolf Edwards (CAN) |
| | | | *Whiplash* (2017)–Stéphane Magnin (FRA) |
| | | | *Incircles* (2019)–Domenico Melchiorre (CHE) |
| | | | *theôrìa α* (2021)–Charles David Wajnberg (FRA) |
| | | | *Theta Carinae* (2019-2021)–Bertrand Gourdy (FRA) |
| | | (with Sixxen and live electronics) | *Feedback* (2007-2008)–M. Perez-Ramirez (CHL) |
| | | | *Beauty will be amnesiac or* [...] (2013)–A.Pateras (AUS) |
| | | | *Um* (2021)–Gitbi Kwon (KOR) |
| | | with 1 sixxen (3) | *Home organs* (2000)–Thomas Meadowcroft (AUS) |
| | | | *beat* (2010)–Sylvain Pohu (CAN) |
| | | (with 1 sixxen and electronics) | *@HOME - 1 - Contact* (2020)–LPS (FRA) |
| | | with 3 sixxens (3) | *S(c)enario* (2011-2012)–Flo Menezes (BRA) |
| | | | *Mechanical ghosts* (2014)–Anthony Donofrio (USA) |
| | | | *Night* (2014)–Ben Davis (USA) |
| | | with 4 sixxens (3) | *Et la pluie se mit à tomber* (1994)–A. Schlünz (DEU) |
| | | | *Envoûtements VI* (2003)–Suzanne Giraud (FRA) |
| | | | *Path* (2021)–Michelle Agnes Magalhães (BRA) |

***Tab. 11-2***. Cont.

| | | | |
|---|---|---|---|
| (Percussion ensemble cont.) | sextet–cont. | with ? sixxen | *Sous-développement* [...] (1999)–H. V. Castañeda (COL) |
| | quartet (14) | with 4 sixxens (7) | *Junkelan* (1993)–David Pye (AUS) |
| | | | *X-trum* (2010)–Fabrice Marandola (FRA) |
| | | | *Microtonal Christmas* [...] (2014)–C.I.M. (USA) |
| | | | *Intra (Intermetamorphosis)* (2017)–Mark Fell (GBR) |
| | | | *Quartered* (2017)–Ryan Lott (USA) |
| | | | *Dance of the Sixxen* [...] (2018)–D. Morphy (USA) |
| | | (with 4 sixxens and live electronics) | *Intermetallic* (2012)–Amanda Cole (AUT) |
| | | 4 bars of Sixxen (2) | *Slow, Text, Fast* (2021)–Zacarias Maia (BRA) |
| | | | *One direction* (2021)–Zacarias Maia (BRA) |
| | | with 12 bars of Sixxen | *Steel Factory* (2006)–Luís Tinoco (PRT) |
| | | with 1 sixxen (3) | *Talea* (2nd version) (2011)–François Sarhan (FRA) |
| | | | *Time in transcendence* (2016)–Joseph Koykkar (USA) |
| | | | *Frammenti* (2019)–Domenico Melchiorre (CHE) |
| | | with 2 sixxens | *After the Zooids* (2015)–Melody Eötvös (AUS) |
| | trio (4) | with 1 sixxen (2) | *Valle-Einstein* [...] (2013)–Giovanni Damiani (ITA) |
| | | | *Frame* (2018)–Domenico Melchiorre (CHE) |
| | | with 3 sixxens (2) | *Epicentre* [...] (2019-2020)–Johannes M. Staud (AUT) |
| | | | *Le petit bossu* (2007)–James Wood (GBR) |
| | duo (3) | 2 sixxens and tape | *Waves To Be Beaten* [...] (2005)–Erik Daelhin (NOR) |
| | | with live electronics (1 sixxen) (2) | *Four meditations* [...] (2014)–Cassiopeia Sturm (USA) |
| | | | *Metal music* (2017)–Paine (AUS) & Mancuso (ITA) |
| | septet (2) | with 1 sixxen | *Sphaira* (2020)–Domenico Melchiorre (CHE) |
| | | with 2 sixxens | *Day* (2015)–Ben Davis (USA) |
| | octet | with 1 sixxen | *Chiffren* (2021)–Domenico Melchiorre (CHE) |
| | nonet | with Sixxen and tape | *Country & Gamelan #5* (2021)–T. Meadowcroft (AUS) |
| **Mixed ensemble** (25) | chamber ensemble (17) | with 1 sixxen (9) | *Adygea* (2005)–Klank Ensemble (PRT) |
| | | | *Ghodoberis* (2005)–Klank Ensemble (PRT) |
| | | | *Payoniiya-tsuro* (2005)–Klank Ensemble (PRT) |
| | | | *Talyshes* (2005)–Klank Ensemble (PRT) |
| | | | *Udmurtia* (2005)–Klank Ensemble (PRT) |
| | | | *Zzyzx* (2005)–Klank Ensemble (PRT) |
| | | | *Lachez tout! / Enough already* (2013)–F. Sarhan (FRA) |
| | | | *An exploration of bright* (2014)–Marc Yeats (USA) |
| | | with percussion soloist (1 sixxen) | *Dans les pas de la main* (2018)–Augustin Braud (FRA) |
| | | keyboard ensemble (1 sampled sixxen) (6) | *Black Dino* (2019)–Bendik HK (NOR) |
| | | | *Dark Green 51* (2019)–Bendik HK (NOR) |
| | | | *Glacier Blue Skylark* (2019)–Bendik HK (NOR) |
| | | | *Grey E Master* (2019)–Bendik HK (NOR) |
| | | | *Sora* (2020)–Gérard Langella (FRA) |
| | | | *Kaiyō* (2020)–Gérard Langella (FRA) |

***Tab. 11-2***. Cont.

| | | | |
|---|---|---|---|
| (Mixed ensemble cont.) | (chamber ensemble–cont.) | with 2 sixxens | *Sky, Let the Rain Fall* (2017)–Sandy Evans (AUS) |
| | | duo marimba, piano and tape (1 sixxen) | *Cloc Ar Y Dwr* (2007-2008)–Jack White (GBR) |
| | Orchestra (5) | with sampler solo (sampled sixxen) | *L'Estuaire du temps* (1993)–François-B. Mâche (FRA) |
| | | opera (1 sixxen) | *Shadowtime* (2004)–Brian Ferneyhough (USA) |
| | | chamber orchestra (1 sixxen) | *Cinemusica* [...] (2016)–Timothy Constable (NLD) |
| | | with Sixxen solo | *After Spring* (2017)–Michelle Agnes (BRA) |
| | | with percussion quartet solo (1 sixxen) | *Niyama* (2019)–Domenico Melchiorre (CHE) |
| | large ensemble (3) | with 1 sixxen | *Journey of the Magi* (2000)–James Wood (GBR) |
| | | with narrator, gamelan ensemble | *The Drummers of Gilgamesh* (2002)–David Pye (AUS) |
| | | with 4 sixxens and electronics | *Protomusic* (2018)–Mark Fell (GBR) |
| **Percussion ensemble + other instrument** (13) | with piano (3) | quintet and piano (1 sixxen) | *Toy* (2006)–Oscar Strasnoy (ARG) |
| | | trio and piano (3 sixxens) | *Adelaide* (2013)–Kristina Warren (USA) |
| | | sextet and piano (1 sixxen) | *No. 56 Scala II* (2014)–Peter Adriaansz (USA) |
| | with organ & strings | sextet, organ and violin (Sixxen) | *Access* (2001)–Claudio Baroni (ARG) |
| | with sampler | quintet and sampler (1 sixxen) | *Khnoum* (1990)–François-Bernard Mâche (FRA) |
| | with choir (3) | sextet and choir (1 or 2 sixxens) | *Idmen A B* (1985)–Iannis Xenakis |
| | | 1 sixxen and choir | *Communio* [...] (2010)–Martin Grubingen (AUT) |
| | | quartet and choir (4 sixxens) | *A strange manuscript* [...] (2016)–Melody Eötvös (AUS) |
| | with wind instrument (5) | sextet and sax quartet (1 sixxen) | *Music of Mercy Pt.3* (1996-1997)–P. Adriaansz (USA) |
| | | Sixxen and oboe | *à.X.* (2004)–Daniel A. Weymouth (USA) |
| | | Sixxen and horn | *Música para Trompa e Sixxen* (2016)–E. Marques (BRA) |
| | | quintet and flute (1 sixxen) | *Samsa* (2021)–Domenico Melchiorre (CHE) |
| | | quintet and saxophone (1 sixxen) | *Aisling* (2022)–Domenico Melchiorre (CHE) |
| **Solo** (4) | | multi-percussion (2) | *Obsolve* (2011)–Sam Britton (GBR) |
| | | | *Breaking the news* (2016)–Isaac Pyaat (USA) |
| | | 1 sixxen | *1, 3, 6, 10…* (2012)–Giovanni Damiani (ITA) |
| | | midi drums and tape | *Psappha, a personal take* (2010)–Enrico Bertelli (ITA) |
| **Soundtrack film** | | pre-recorded excerpts | *On the Passage of a Few* [...] (2018)–N. Deane (GBR) |
| **?** | | ? | *Nouvelle œuvre pour Sixxen* (2022)–Contrechamps (CHE) |

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**Complementary information**

? – Information not found

These data show even more clearly how the construction of a Sixxen to play *Pléïades* encourages musicians to compose or commission new pieces with other composers. Consequently, the connection of the repertoire with the Xenakian instrument through the formation of the percussion ensemble is very significant and consequent. Thus, the repertoire expansion with a progressive construction of prototypes and models started with percussion pieces but quickly passed to integrate more diverse instrumentations (Xenakis already encouraged it with *Idmen A B*) and progressively incorporated chamber works with other instruments (saxophone, oboe, piano, horn, cimbalom, among many others), works for soloist and orchestra, soloist and ensemble, opera, soundtrack of film, and percussion solos.

The data also presents the specific pieces that interact with electronics and different resources were used in those cases (by the use of tape, or by the use of live electronic devices), with 25 pieces created. This is an expansion of the data presented by Morais & Araújo (2018) that listed 11 pieces with electronic interaction between 2010 and 2014. Here it is demonstrated that those interactions started in the 1990s, data the authors did not consider. It is also shown that the interactions are much more diversified, and sixxen(s) are used to interact with artistic installations as a pre-recorded soundtrack (as produced by Gustavo Costa), as a live instrument (*Protomusic*–2018 by Mark Fell), or yet, as mentioned for the mechanized sixxen created by Cassiopeia Sturm (as better presented in Chapter 10–Section 10.2.1). There are also works interacting with video, such as *Lachez tout! / Enough already* (2013) by Sarhan, *beat* (2013) by Pohu, *Cinemusica - Two movements for percussion & strings* (2016) by Timothy Constable, or *On the Passage of a Few Ants Through a Rather Brief Unity of Time* (2018) by Nicola Deane.

Something quickly adopted, tied to the electronic interaction, was to sample the instrument and use its sound qualities as a resource in pieces in which the instrument is not acoustically necessary. This sampling started in 1990 with *Khnoum* by Mâche and represented an interesting alternative to his *L'Estuaire du temps* (1993). After that, many composers, such as Bendik HK, Enrico Bertelli, Gérard Langella, Jack White, and Mark Fell, adopted this resource. There is even commercial interest in a product created by the company 8Dio, specifically turned to music software, sound sampling, and developing digital libraries of sounds for various instruments. The company offers the Aura Studio Exotic Percussion as a sample set, with a Sixxen as one of the five instruments to be chosen. The samplers can reproduce different sounds of a sixxen recorded with three positions of microphones and different mallets. Thus, they developed a very particular perspective on the sounds of the Xenakian instrument, and this software allowed musicians to access it. This sample set seems to be originated in a recording of an aluminum sixxen with inverted-U bar profiles. It certainly supported many compositions not mentioned here and will result in many more new pieces and approaches in

the future.

The broad diversification of Sixxen application and the different artistic contexts in which the instrument is present are evident. Considering also the numerous works that were not found in the present research, it could be reinforced that this instrument is progressively becoming an object of interest in different situations and compositional approaches.

## 11.2 Post-Xenakian notation

The different notations for a Sixxen used by Xenakis and their continuous development process were previously addressed in Chapter 3–Subchapter 3.2 and partially in Chapter 4–Section 4.2.3. Here, a discussion will be thus established on the posterior repertoire, focusing on the contributions that other composers brought to this specific instrument literature and highlighting some perspectives that expanded its notation. Thus, consulting the scores, it is clear that a significant amount of works is based exclusively on the notation as finally established in the last version of the individual parts of *Pléïades* (Xenakis, 1988), such as those presented in Fig. 11.2.

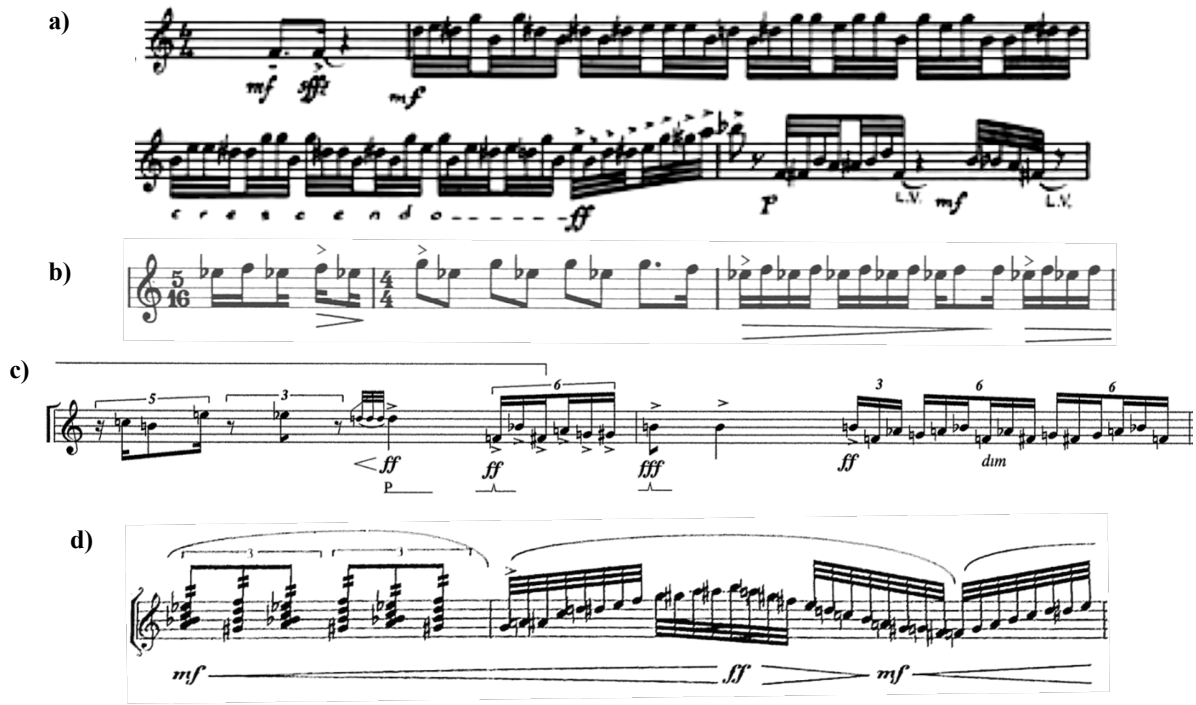



***Figure 11.2***. Examples of excerpts for sixxen from the 1980s, 1990s and 2000s. **a)** *Le livre des claviers,* «*III*», meas. 1-4, player 3 (Manoury, 1988) – © Amphion. **b)** *Sechse kommen durch die Welt*, meas. 46, player 2 (Glandien, 1994) – © Lutz Glandien. **c)** *Métal*, meas. 19, player 1 (Manoury, 1995) – © Éd. Durand. **d)** *Senza*, meas. 22, player 1 (Paris, 2005) – © Éd. Billaudot.

In the first pieces composed by a different composer than Xenakis, such as *Le livre des claviers* (1987-1988) by Philippe Manoury or *Khnoum* (1990) by François-Bernard Mâche, the notation

stayed quite the same, concentrated in treble clef from $F^4$ to $B^5$ (Fig. 11.2a and b). This continued in the 1990s and 2000s when scores were essentially produced in the same standard presentation (Fig. 11.3c and d). Even experimental pieces, such as *beat* (2010) by Sylvain Pohu, which give some freedom for improvisation and with video interaction (Fig. 11.3a), were eminently using this kind of conventional notation.

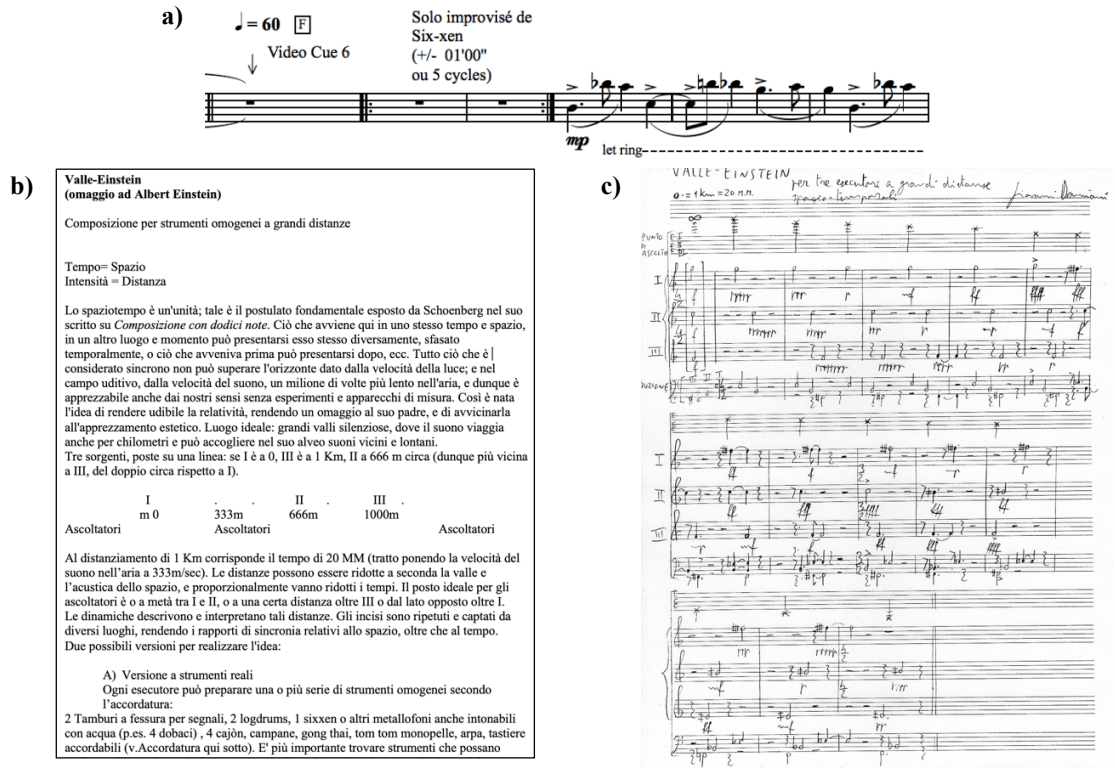



***Figure 11.3***. Examples of pieces with different experimental approaches in the beginning of the 2010s. **a)** Interaction with video in *beat*. Source: *beat*, meas. 39-44 (Pohu, 2010) – © Sylvain Pohu. **b)** and **c)** Respectively the textual introduction about the piece and conventional notation used in *Valle-Einstein*. Source: *Valle-Einstein (omaggio ad Albert Einstein)*, p. i and 1 (Damiani, 2013) – © Giovanni Damiani.

Giovanni Damiani composed *Valle-Einstein (omaggio ad Albert Einstein)* in 2013, a trio that could also be performed as an electronic version. The musicians (or the electronic version's sound sources) must be placed very far from each other (666 meters between player I and II and 1km between player I and III). The composer used a textual explanation as an introduction to describe the musicians' disposition, the choices of instruments (including one sixxen), and the differences between the instrumental and the electronic version (Fig. 11.3b). However, this is not an exclusively textual score because it is also accompanied by a score with all the musical indications as previously stipulated and commonly used (Fig. 11.3c).

From the first half of the 2010s, some interesting exceptions started to appear, with composers adapting their compositional approaches and aesthetics in terms of score presentation. In *Adelaide* (2013), e.g., Kristina Warren presented a notation based on a system of colors that indicates

specific rhythmic patterns that could be used with a certain freedom[4]. The pitches to be played are previously indicated, but the rhythmic development is subject to the choices of the interpreters, that has some margin to decide among specific possibilities (Fig. 11.4).

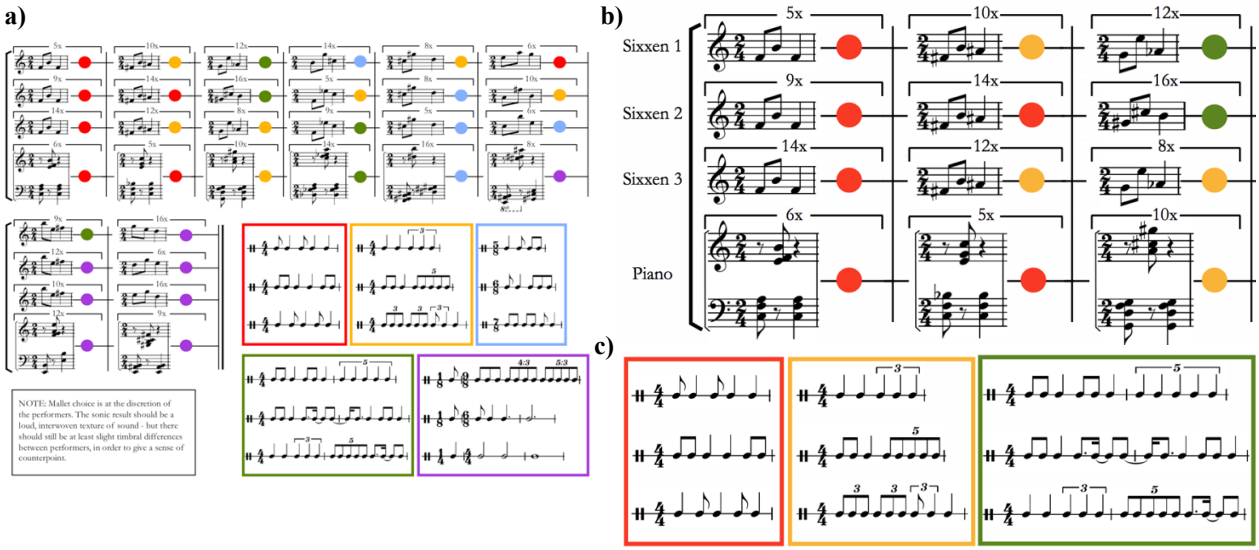



***Figure 11.4***. Notation for sixxens in *Adelaide* (2013), by Cristina Warren. **a)** General view of the score and association of colors. **b)** Indication of materials to be played and colors associated to potential rhythmic choices. **c)** Boxes associated with the colors giving some choices. Source of all: *Adelaide*, p. 1 (Warren, 2013) – © Kristina Warren.

The image above shows an overview of the type of notation that Warren developed (Fig. 11.4a). It also shows the first three bars of the work (Fig. 11.4b), presenting the material written for sixxens and piano with defined pitches and rhythm initially defined in 2/4 followed by the indication of colors. The colors thus refer to a set of rhythmic structures (Fig. 11.4c) in which the performer chooses the possibility (or possibilities) he will apply the notes exposed in 2/4 during each repetition. In this work, the association with colored boxes used by Warren shows an original way to explore the notation for SIX-XEN, and because of that, this piece was presented during the artistic development of the present discussion[5].

Cassiopeia Sturm composed *Four meditations on the stars* (2014) using eminently graphic notation and combining it with the previous notation for one sixxen (Xenakis, 1988). As she stated:

> I was extremely attracted to the approach of microtonal composition through avenues of chance. While composing the work I obviously drew upon the astrological inspiration for Pleiades to inform the direction I was taking, though arguably slightly more literally. Xenakis' output has always been a huge inspiration. Consistently in my own works I draw on his ideas of stochasticity and algorithm as methods of music making. (Cassiopeia Sturm, email to author, April 16, 2016).

[4] This system of notation with colors that allows some freedom to the interpreters is based on a previous one that she used in his work *Pogpo* (2012) for four electric guitars. They are not used exactly the same way but they have some characteristics in common.

[5] See more details in Chapter 8 that also give access to the recording.

This piece is a percussion duo for triangles, a thundersheet, and one sixxen with live electronics, being the notation for percussion presented above and the notation for a sixxen bellow in the score (Fig. 11.5). Both parts are notated graphically and interconnected by dotted vertical lines as points of reference to play synchronically.

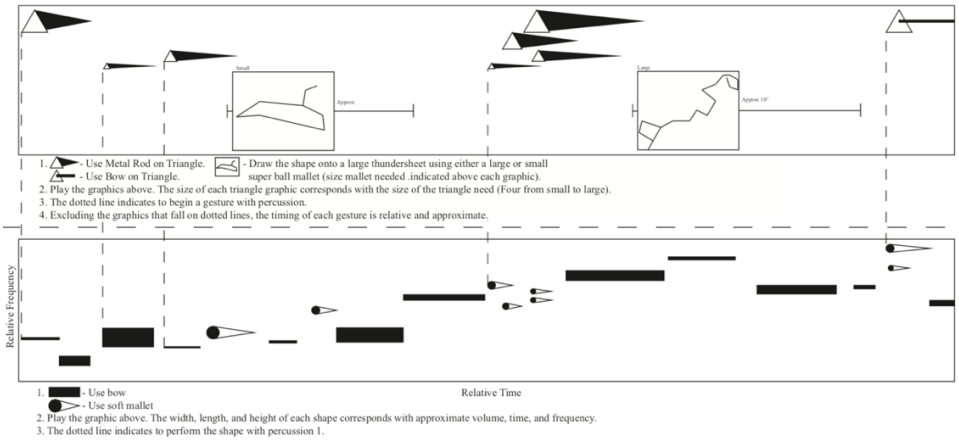



***Figure 11.5***. Graphic notation in «*Spring Equinox*» of *Four meditations on the stars* (2014), by Cassiopeia Sturm. Source: *Four meditations on the stars*, p. 1 (Sturm, 2014) – © Cassiopeia Sturm.

It is verifiable in Fig. 11.5 above that the specific part for a sixxen is notated exclusively with graphic elements. It shows the specific indication for using the bow (rectangles filled with black) and soft mallets (black circles with a white triangle) without fixing the notes to be played but indicating a close range to be respected. The piece starts thus with the lower notes of the sixxen progressing to the higher ones as the movement «*Spring Equinox*» is developed. The notation used in «*Summer Solstice*» shows that the more conventional notation also appears (Fig. 11.6).

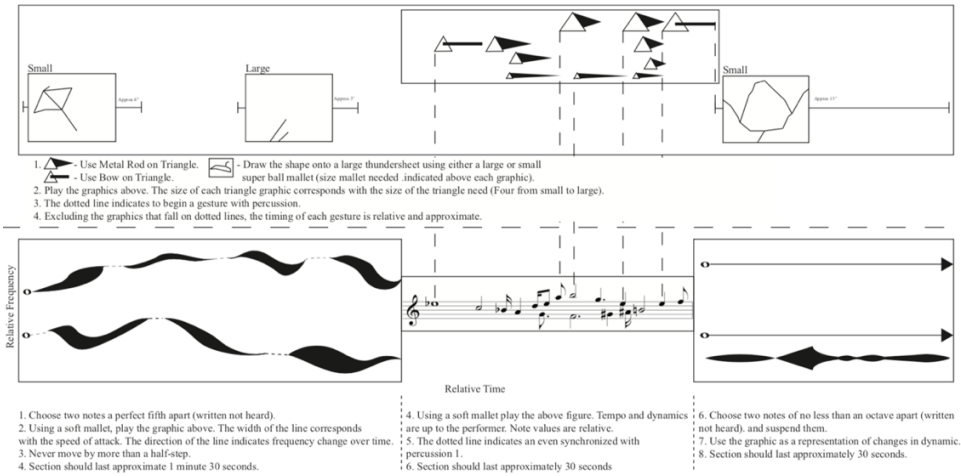



***Figure 11.6***. Graphic and standard notation for sixxen in «*Summer Solstice*» of *Four meditations on the stars* (2014), by Cassiopeia Sturm. Source: *Four meditations on the stars*, p. 2 (Sturm, 2014) – © Cassiopeia Sturm.

In the excerpt of the piece indicated above, the intermediary section is based on the standard

notation suggested by Xenakis (1988). The image clearly distinguishes the three passages, exposing the transitions in terms of sonority and effects for the sixxen part (indicated by a relative notation and an exact notation). Another element that also allows some freedom to the performance is present in «*Fall Equinox*», which has a section constructed with rhythmic boxes (Fig. 11.7). Those boxes can be repeated, and because they are connected, they allow specific paths to develop the musical material, aggregating a great degree of variability to the piece.

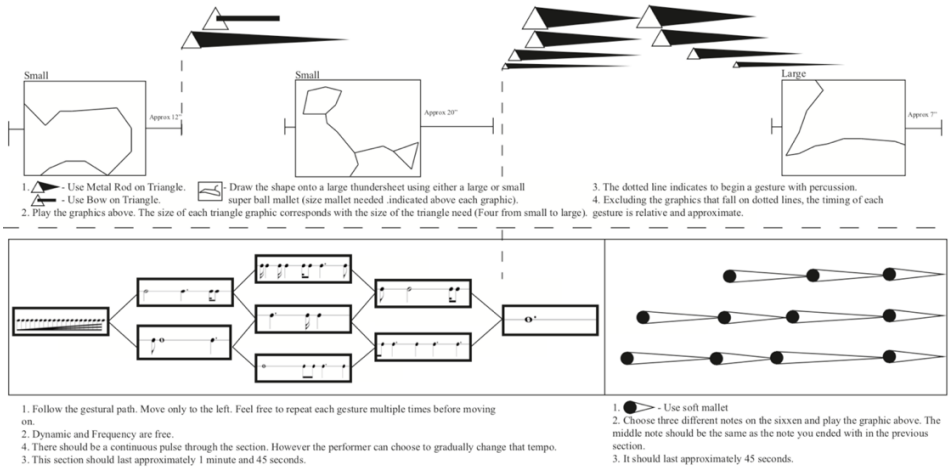



***Figure 11.7.*** Graphic notation for sixxen in «*Fall Equinox*» of *Four meditations on the stars* (2014), by Cassiopeia Sturm. Source: *Four meditations on the stars*, p. 4 (Sturm, 2014) – © Cassiopeia Sturm.

As the composer mentioned about her piece:

> I think instruments like this have two challenges depending on the type of project you are working on. If you are working with a very specific Sixxen you have to spend a lot of time explore the unique qualities of that instrument. This type of process was something I was very involved in when I first began working on "Four Meditations…" However, composing a work for Sixxen challenges composers to create a score or notation system that can translate across instruments of extremely various tunings and timbres. Working on Four Meditations on the Stars really challenged me to unite these two very different ways of working. (Cassiopeia Sturm, email to author, April 16, 2016).

Thus, Sturm consciously contributed with a very particular and differentiated notation for SIX-XEN, standing out in the panel of works for the instrument. This notation has numerous particularities not observable in the rest of the repertoire, reason why it was part of the practical development of this dissertation[6].

*After Spring* (2017), composed by Michelle Agnes Magalhães, is the first Concerto for Sixxen and orchestra. The notation indicates precise sounds that the composer explored as a result of a prepared Sixxen. Magalhães thus requires particular treatments and preparations on specific bars that are notated by changing the head of the note (Fig. 11.8). Based on Xenakis' notation in *Pléïades*'

[6] See more details in Chapter 8 that also give access to the recording.

1988 version, she indicates in a synthetic, direct, and precise way the determined preparations that each sixxen demands and the changes throughout the piece[7] by changing the note head's presentation.

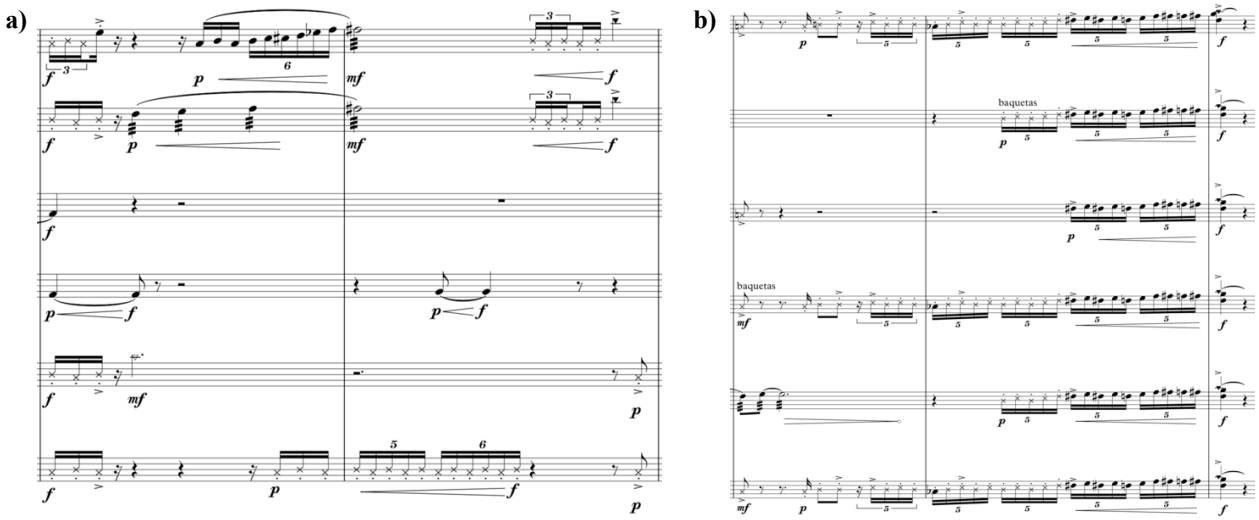



***Figure 11.8***. Specific notation for prepared Sixxen in *After Spring* (2017) by Michelle Agnes Magalhães. **a)** Part of soloists. Source: *After Spring*, meas. 2-3 (Magalhães, 2017) – © Michelle Agnes Magalhães. **b)** Part of soloists. Source: *After Spring*, meas. 49-51 (Magalhães, 2017) – © Michelle Agnes Magalhães.

Anna Sowa composed *Seven* (2021) for Sixxen and tape, with two distinguished sections and main sonorities, developing a progressive transformation of one kind of sound (muffled) to the other (resonant). She used, as Magalhães, the same resource of notehead changing to indicate the different sonorities. Sowa thus differentiated the indication of notes without resonances (muffle sounds with an X notehead) and notes with resonances (normal notehead), as visible in Fig. 11.9a and b. Daphné Hejebri also used the same resource to explicit the changes of the timbres in *Σχίζειν–Schizein* (2021). However, in the same score, she is using it for different results because sometimes it refers to a change of mallets all over the notation and sometimes to muffling effects (Fig. 11.9c and d).

[7] The premiere of the piece can be accessed on Youtube by the link: https://www.youtube.com/watch?v=gYCYiyYjrDk&ab_channel=michelleagnes

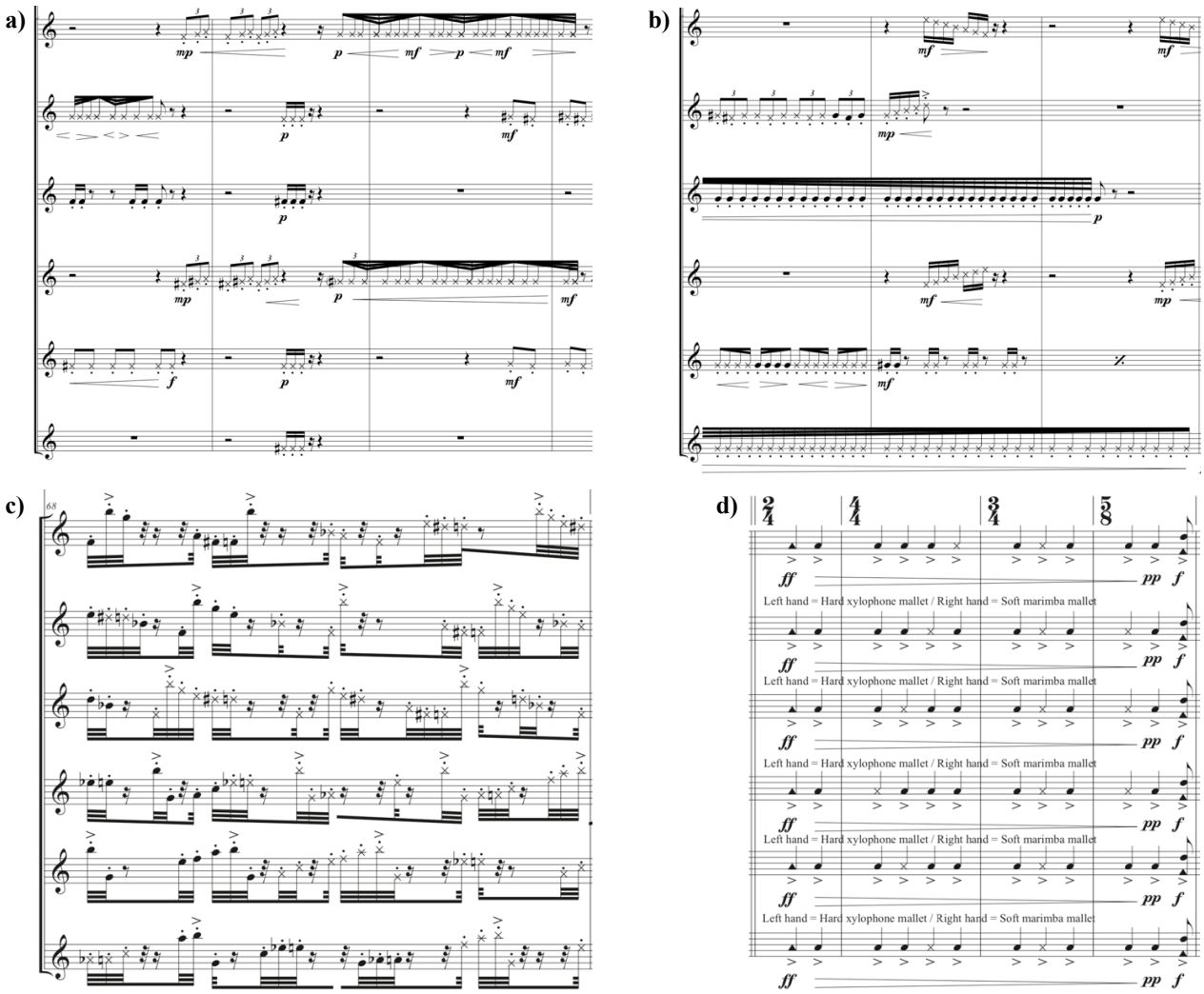



***Figure 11.9***. Examples of pieces for a Sixxen using different noteheads. **a)** and **b)** The X noteheads indicate a variation on dampened sound. Source: *Seven*, meas. 49-51 and 54-56 (Sowa, 2021) – © Anna Sowa. **c)** The X noteheads indicate the use of a needle as mallet. Source: *Σχίζειν–Schizein*, meas. 68 (Hejebri, 2021) – © Daphné Hejebri. **d)** The X noteheads indicate a dampened sound and the triangle noteheads indicate the use of a plastic mallet. Source: *Σχίζειν–Schizein*, meas. 72-75 (Hejebri, 2021) – © Daphné Hejebri.

Like the last two examples, the pieces discussed from now on were specifically commissioned during this research and present interesting contributions to the repertoire. They generally use the treble clef and the range, as indicated by Xenakis from 1988, but they also present some particular ways to present the instrument. As a first example, Charles David Wajnberg composed *theôrìa α* (2021) using a proportional notation and a temporal representation that indicates synchronized and non-simultaneous actions regarding the succession of events (Fig. 11.10a and b). This piece has some notational similarities with *Hiérophonie V* (1974) by Yoshihisa Taira, developing its materials through an installation of six percussionists surrounding the public. Bertrand Gourdy also used a similar system in *Theta Carinae* (2019-2021) to indicate the start of layers with different tempos and time signatures superposed from specific moments (Fig. 11.10c and d). In Wajnberg and Gourdy's

music, the notation helps to create different textures and densities all over the pieces, being a factor that turns more dynamic and challenges the chamber music possibilities as a whole.

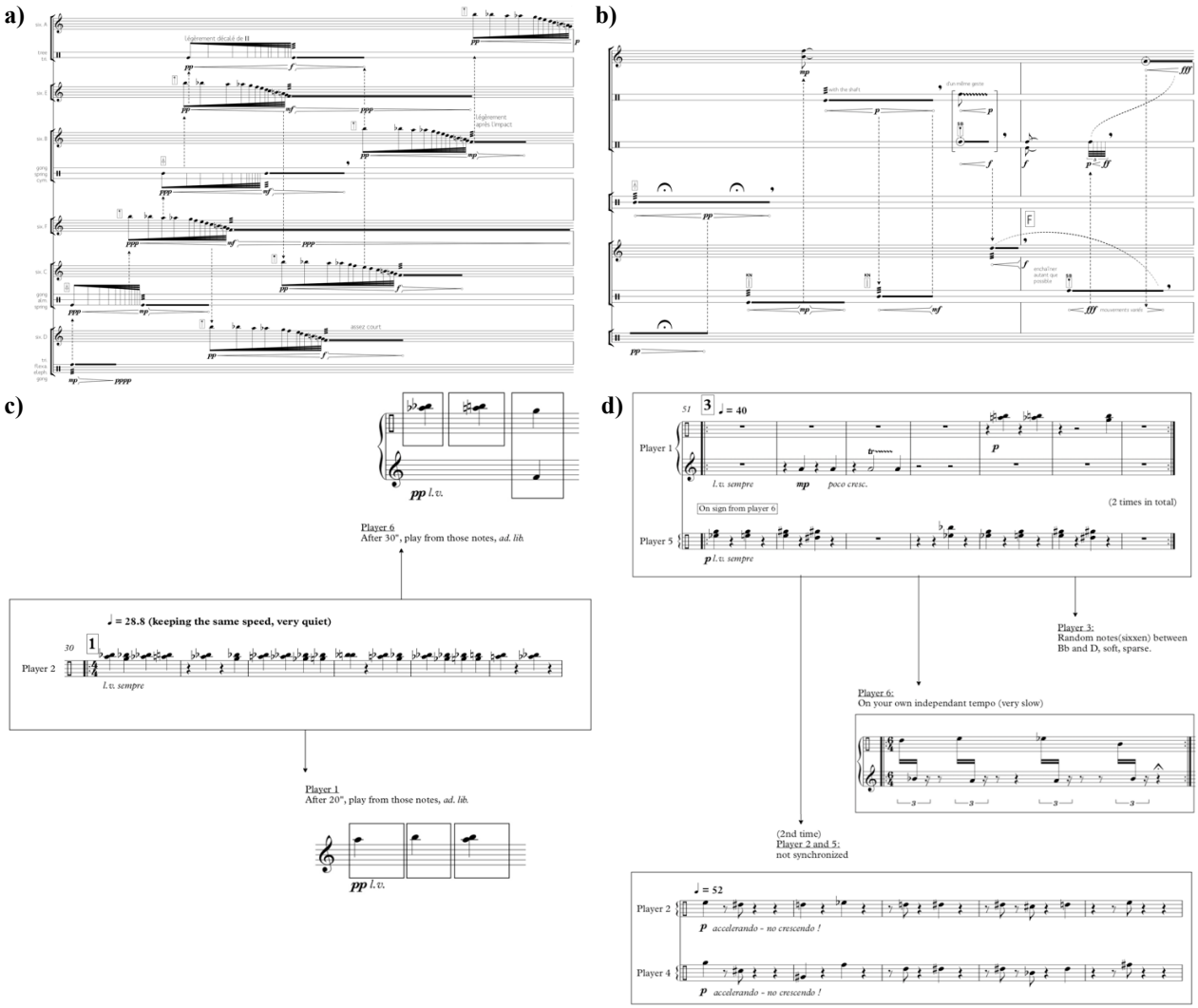



***Figure 11.10***. Examples of notational resources to indicate synchronized and non-simultaneous actions in *theôrìa α* (**a** and **b**) and *Theta Carinae* (**c** and **d**). Source in a) and b): *theôrìa α*, p. 5 and 8 (Wajnberg, 2021) – © Charles David Wajnberg. Source in c) and d): *Theta Carinae*, meas. 30-35 and 51-62 (Gourdy, 2021) – © Bertrand Gourdy.

Gitbi Kwon also composed layers of synchronized sounds in *Um* (2021) for a Sixxen, snare drums, and timpani stimulated by transducers. However, to achieve the different layers of a progressive sonority constantly evolving, she worked with time synchronization of events by proportional notation and the use of a chronometer (Fig. 11.11).

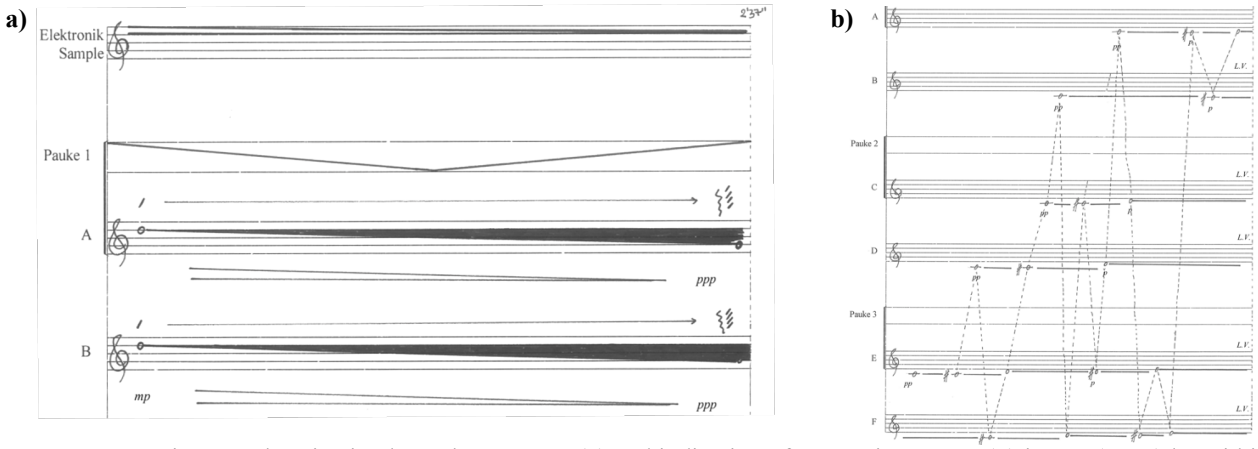



***Figure 11.11***. Time synchronization by a chronometer (**a**) and indication of successive events (**b**) in *Um* (2021) by Gitbi Kwon. Source: *Um*, p. 4 and 12 (Kwon, 2021) – © Gitbi Kwon.

Meadowcroft composed *Country & Gamelan #5* (2021) to gamelan instruments, Sixxen, percussion, and electronics (section A is indicated in Fig. 11.12a). By the use of some melodic structures that can be played by gamelan metallophones (a djegogan, a calung, or a kantilan, e.g.) and by sixxens, the composer proposed a system of repetitive melodies that are continuously presented in an interlocking texture (Fig. 11.12b). Meadowcroft elaborated thus a common notation to gamelan instruments and Sixxen using the bass clef (Fig. 11.12c).

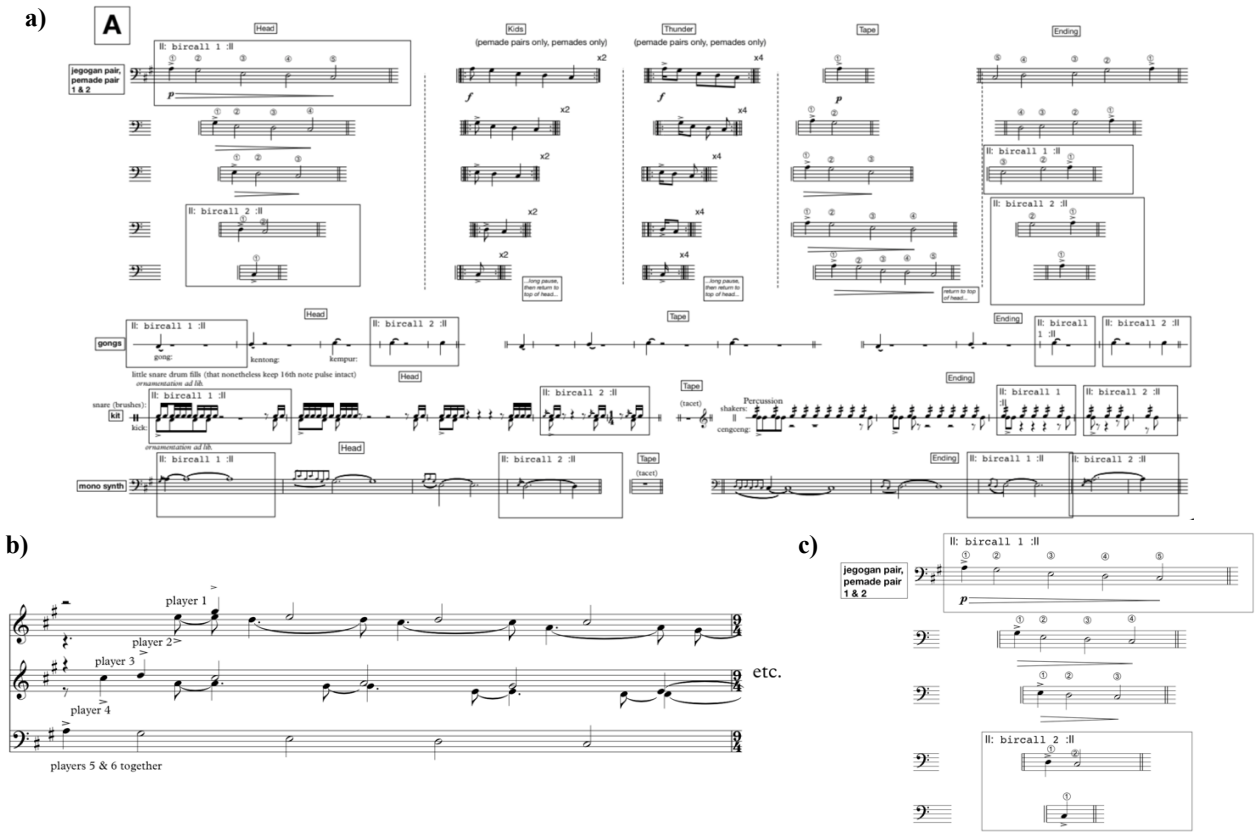



***Figure 11.12***. Notational representation of *Country & Gamelan #5* (2021) by Thomas Meadowcroft. **a)** Structures of the section A. **b)** Development of the interlocking by players 1 to 6. **c)** Detail of the section A. Source of all: *Country & Gamelan #5*, p. i and 1 (Meadowcroft, 2021) – © Thomas Meadowcroft.

Michelle Agnes Magalhães composed *Path* (2021) also for gamelan and Sixxen as a result of the commission for the present dissertation. She then used a system of colors to present some structures and to be precise in terms of the repetitions and connections between the musicians (Fig. 11.13). The colors mainly indicate a sequence of non-equal and progressively augmented repetitions. These repetitive sequences occur inside a form similar to a Canon in which the players successively enter into the texture to develop the augmentative repetitions.

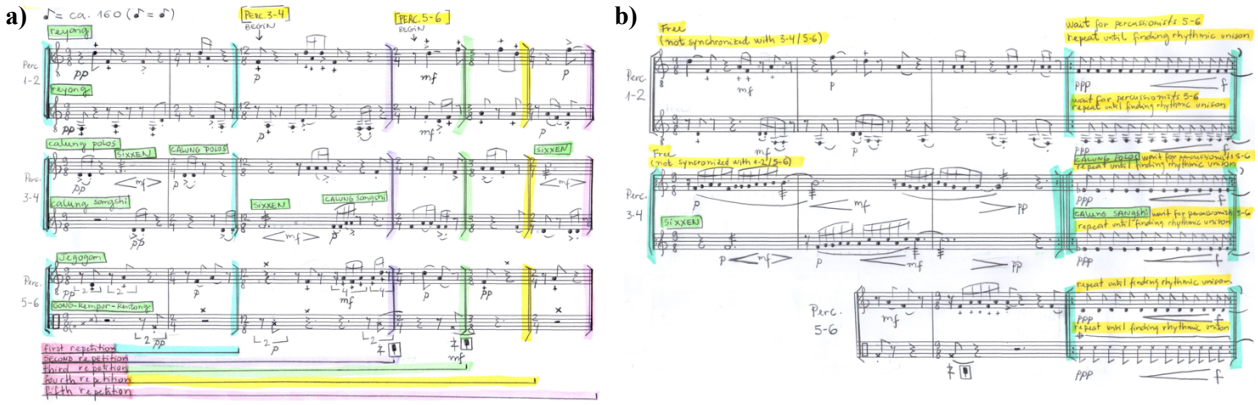



***Figure 11.13***. Notation using colors to highlight strucutral elements in *Path* (2021) by Michelle Agnes Magalhães. **a)** «*Spiral repeated Canon*». **b)** «*Transition – Meeting point*». Source of both: *Path*, p. 1 and 2 (Magalhães, 2021) – © Michelle Agnes Magalhães.

Zacarias Maia composed *Slow, Text, Fast* (2021) and was the first to propose a piece wholly based on a textual score (Fig. 11.14a). His notation uses some graphics to present and describe specific actions and moves all over the piece (Fig. 11.14b), but its textual indications eminently describe it.

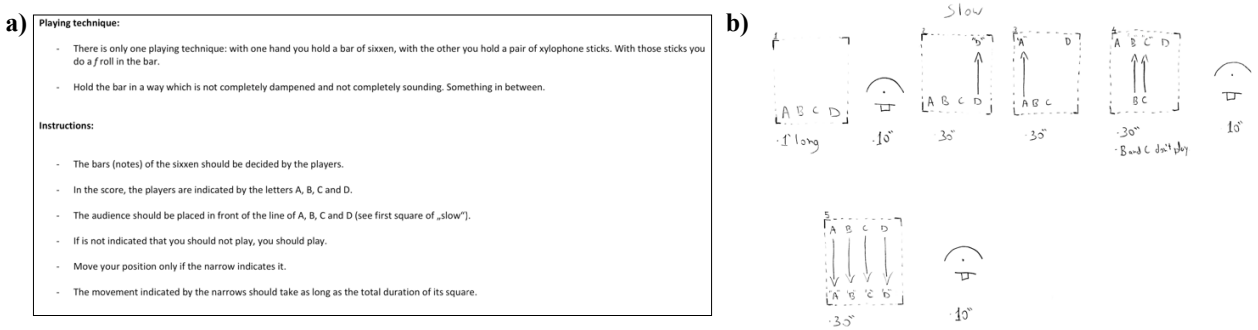



***Figure 11.14***. *Slow, Text, Fast* (2021) by Zacarias Maia. **a)** Textual score. **b)** Part of the graphics representing specific actions during the piece. Source of both: *Slow, Text, Fast*, p. 1 and 3 (Maia, 2021) – © Zacarias Maia.

The material presented here highlights the diverse aspects that characterize this specific literature. The relationship with new composers has generated a prolific source of contributions to the repertoire of certain groups. These dynamic collaborations also improve the perception that the Xenakian instrument is accessible, feasible, and adaptable in many different context. To finish this dissertation on the extensive infiltration of the SIX-XEN in different musical contexts, the recordings on which it is available to be listened to will now be discussed.

## 11.3 Recordings of Sixxens

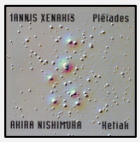
As addressed and emphasized by different authors, the recordings are an important source of register and archiving music (Arbo, 2017), an important tool for musicology and research on performance (Lassauzet, 2017; Walker, 2017). It can prolong, to some degree, an acoustic phenomenon, and because of that, it became an important tool for understanding music and its agents. The development of recording techniques thus had a considerable impact on musical production, human hearing, global accessibility, and on the consumption of music in the first half of the 20th century (Lephay, 2017). They will be thus presented from now the recordings using Sixxens but only those recorded explicitly for phonographic diffusion; videos and online recordings not launched as an album by a specific label were not considered. The data gathered here was essentially divided into recordings of *Pléïades* and recordings of other works and composers using Sixxens, allowing an extensive overview of the accessibility of the instrument by albums launched officially. The data about recordings of *Pléïades* are then concentrated in Table 11-3.

***Table 11-3***. Recordings of *Pléïades* organized by year of release with information about the ensemble, the name of the album, the label, the musicians, and the order of movements (O.Mo.).

| Year | Ensemble or artist | Album | Label | Musicians | O.Mo. | Cover |
|---|---|---|---|---|---|---|
| 1986 | Makoto Aruga Percussion Ensemble | Iannis Xenakis – Pléiades<br>Josep Soler – Noche escura[8] | CBS / Sony | Makoto Aruga, Shiniti Ueno, Takaya Nakatani, Takashi Fukuda, Toshiyuki Matsukura, Takako Yamaguchi | ML<br>C<br>M<br>P |  |
| 1987 | Les Percussions de Strasbourg | Iannis Xenakis – Pléiades[9] | Harmonia Mundi | Christian Hamouy, Claude Ricou, Gabriel Bouchet, Georges van Gucht, Keiko Nakamura, Jean-Pierre Bedoyan (Iannis Xenakis present) | ML<br>M<br>C<br>P |  |
| 1989 | Les Percussions de Strasbourg | Iannis Xenakis – Pléiades | Denon | Christian Hamouy, Guillaume Blaise, Jean-Paul Bernard, Jean-Pierre Bedoyan, Keiko Nakamura, Vincent Vergnais | ML<br>M<br>C<br>P |  |
| 1990 | Kroumata | Iannis Xenakis | Bis | Anders Loguin (Cond.), Anders Åstrand, Anders Holdar, Ingvar Hallgren, Jan Hellgren, Johan Silvmark, Leif Karlsson | M<br>C<br>ML<br>P |  |
| 1992 | Les Pleiades | Iannis Xenakis – Idmen Pléïades | Erato Disques | Sylvio Gualda (Cond.), Arielle Vaconsin, Christine Lagniel, Claire Talibart, Eve Payeur, Hélène Colombi, Marianne Delafon | ML<br>C<br>M<br>P |  |

[8] Recorded July 1985 at the Ishibashi Memorial Hall (Japan).
[9] Recorded January 1986 at *Centre Europe de Colmar* (France).

***Tab. 11-3***. Cont.

| | | | | | | |
|---|---|---|---|---|---|---|
| 1995 | Brake drum percussion | Iannis Xenakis – Pléïades<br>Akira Nishimura – Ketiak | Nota | Pietro Bertelli (Cond.), Andrea De Marchi, Andrea Mascherin, Davide Micheletto, Enrico Bertelli, Gianni Casagrande, Luca Carrara | M<br>C<br>ML<br>P |  |
| 2007 | Red Fish Blue Fish<br>Steven Schick (Dir.) | Xenakis percussion works | Mode Records | «*Mélanges*»: Don Nichols, Gustavo Aguilar, Lisa Tolentino, Morris Palter, Rob Esler, Ross Karre<br>«*Claviers*», «*Métaux*», «*Peaux*»: Brett Reed, David Shively, Ivan Manzanilla, Patti Cudd, Terry Longshore, Vanessa Tomlinson | ML<br>C<br>M<br>P |  |
| 2015 | Slagwerk Den Haag | SIX | Slagwerk Den Haag | Fedor Teunisse, Frank Wienk, Joey Marijs, Juan Martinez, Niels Meliefste, Pepe Garcia | M |  |
| 2015 | Kuniko Kato | Iannis Xenakis | Linn Records | Kuniko Kato | ML<br>M<br>C<br>P |  |
| 2016 | Synergy Percussion | Xenakis: Pleiades | Synergy Percussion | Timothy Constable (Cond.), Alison Eddington, Colin Piper, Ian Cleworth, Michael Askill, Philip South, Rebecca Lagos | M<br>C<br>ML<br>P<br>ML |  |
| 2019 | DeciBells | Pléïades by Iannis Xenakis | Genuin | Domenico Melchiorre (Cond.), Adrian Romaniuc, David Gurtner, Robin Fourmeau, Sakiko Yasui, Szilárd Buti, Till Lingenberg | C<br>P<br>M<br>ML |  |
| 2022 | Les Percussions de Strasbourg | Xenakis: Pléiades & Persephassa | Les Percussions de Strasbourg / Believe Digital | Minh-Tâm Nguyen (Dir.), Alexandre Esperet, François Papirer, Hsin Hsuan Wu, Thibaut Weber, Yi-Ping Yang | ML<br>C<br>M<br>P |  |

**Legend:** Cond. – conductor Dir. – director O.Mo. – order of movements
C – «*Claviers*» M – «*Métaux*» ML – «*Mélanges*» P – «*Peaux*»

*Pléïades* has, thus, at least 12 official recordings of 10 different groups from 8 countries (Australia, France, Italy, Japan, Netherlands, Sweden, Switzerland, and the USA) and 12 different labels launched all over the world, as gathered and indicated in Table 11-3 above. The recordings are eminently European (7 recordings), and *Les Percussions de Strasbourg* is the only group with three different recordings. Something interesting to point out is that the first ensemble to record *Pléïades* was not them but the group Makoto Aruga Percussion Ensemble (Japan). This Japanese ensemble launched in 1986 their album (recorded July 1985 at the Ishibashi Memorial Hall) while *Les Percussions de Strasbourg* made it in 1987 (recorded January 1986 at *Centre Europe de Colmar* with

Xenakis at the recording sessions and supervising the sound engineers).

The order of the movements is very diversified, but there are some tendencies regarding each one. Generally speaking, «*Mélanges*» tends to be positioned as the first movement (it occurred in 7 recordings), «*Claviers*» as the second (7 recordings), «*Métaux*» as the third (5 recordings) and «*Peaux*» the last one (9 recordings). It is thus perceptible also that the most variable movement in those orders is «*Métaux*», presenting the first position three times, the second three times, and the third five times, never being used as a concluding movement. This movement was also chosen by Slagwerk den Haag as the only one to be launched in their album SIX.

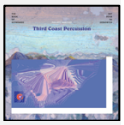
So, thinking that listening to the instrument can happen through other recordings than just *Pléïades*, it is necessary to consider the other released albums gathered here in Table 11-4. About the recordings of other works with a Sixxen, it can be seen in the table below that 31 pieces have been recorded in 22 different albums by 18 ensembles from 9 countries and 21 different labels. The table shows that the percussion ensembles are important in this specific production, representing almost 81% of the recordings (18 albums by percussion ensembles). The recordings are eminently European (15 recordings), and Les Percussions de Strasbourg is the only group to have four different recordings, while Slagwerk den Haag and Drumming have two albums released. The first ensemble to record a different piece than *Pléïades* was Les Pléiades with Sylvio Gualda and the Choir Gulbenkian, which launched *Idmen A B* in a complete album about Xenakis in 1992.

Table 11-4 shows that even if it is more concentrated in percussion literature, a certain penetration of the Sixxen in different musical contexts and aesthetics is starting to occur, stimulated by a certain interest from musicians of different backgrounds. In this perspective, some albums are very representative of that, such as Minorities & Oddities by Klank Ensemble, Depot by Bendik HK, and Extatic Dream by Mr. Untel. The first album is distributed by Go to War, an independent Porto-based label dedicated to releases around experimental music, free improvisation, rock, and heavy metal. The second album is distributed by Mutual Intentions, an Oslo-based label that works in music and visual arts, with albums of pop, rap, disco, dance floor, and jazz. Elliot Music released the third album, an independent production and publishing company with albums of House, Lounge, Latin, Pop, and Rock, that also produces materials for films, advertising, and broadcast.

***Table 11-4***. Recordings of Sixxens applied to the post-*Pléïades* repertoire organized by year of release with information about the ensemble, the musicians, the title of the piece recorded, the composer, the name of the album, and the label.

| Year | Ensemble: musicians | Title (Year) | Composer | Album | Label | Cover |
|---|---|---|---|---|---|---|
| 1992 | **Les Pléiades**:<br>Sylvio Gualda (Cond.)<br>Voices: Choeur Gulbenkian<br>Percussion: Arielle Vaconsin, Hélène Colombi, Claire Talibart, Eve Payeur, Christine Lagniel, Marianne Delafon | *Idmen A B* (1985) | Iannis Xenakis | Iannis Xenakis Idmen, Pléïades | Erato Disques |  |
| 1993 | **Les Percussions de Strasbourg**:<br>Georges van Gucht (Art. dir.)<br>Christian Hamouy, Jean-Paul Bernard, Keiko Nakamura, Bernard Lesage, Claude Ferrier, Olaf Tzschoppe | *Le livre des claviers* (1988/1989)<br><br>*Khnoum* (1990) | Philippe Manoury<br><br>François-Bernard Mâche | Les Percussions de Strasbourg | Philips |  |
| 1994 | **Nova Ensemble**:<br>Mark Cain, Neil Craig, Amanda Dean, David Pye | *Junkelan* (1993) | David Pye | Nova ensemble Junkelan | NOVA CD |  |
| 1998 | **Les Percussions de Strasbourg**:<br>Bernard Lesage, Claude Ferrier, Jean-Paul Bernard, Jonathan Faralli, Keiko Nakamura, Olaf Tzschoppe | *Et la pluie se mit à tomber* (1994) | Annette Schlünz | Annette Schlünz: Portrait du compositeur | Wergo World |  |
| 1998 | **Red Fish Blue Fish**:<br>Steven Schick (dir.)<br>Terry Longshore, Vanessa Tomlinson, Patti Cudd, Ivan Manzanilla, Brett Reed, David Shively | *Interregna* (1998) | Mark Osborn | Interregna | AXI |  |
| 2000 | **Orchestre philharmonique de Radio France**<br>Michaël Levinas – soloist<br>Elgar Howarth (Cond.) | *L'Estuaire du temps* (1993) | F.-B. Mâche | François-Bernard Mâche L'Estuaire du Temps /Braises / Andromède | MFA – Radio France |  |
| 2002 | **Slagwerk Den Haag & het Aurelia Saxofoonkwartet**:<br>Jonathan Stockhammer (Cond.)<br>Sax quartet: Niels Bijl, Willem Van Merwijk, Johan van der Linden, Arno Bornkamp; Percussion group: Emiel Matthijsse, Fedor Teunisse, Fredrike de Winter, Marcel Andriessen, Martin Ansink, Tom van der Loo | *Music of Mercy Pt.3* (1996-1997) | Peter Adriaansz | Slagwerk Den Haag & het Aurelia Saxofoon-kwartet | Slagwerk Den Haag |  |
| 2005 | **Klank Ensemble**:<br>José Miguel Pinto, Albrecht Loops, João Tiago, Gustavo Costa, Ana Costa, João Martins, Alexandre Gamelas | *Adygea*<br>*Ghodoberis*<br>*Payoniiya-tsuro*<br>*Talyshes*<br>*Udmurtia*<br>*Zzyzx* | Klank Ensemble | Minorities & Oddities | Let's Go To War |  |
| 2005 | **Les Percussions de Strasbourg**:<br>Bernard Lesage, Claude Ferrier, François Papirer, Jean-Paul Bernard, Keiko Nakamura, Olaf Tzschoppe | *Khnoum* (1990) | F.-B. Mâche | Maraé, Aera, Khnoum, Le Printemps du Serpent | Universal |  |
| 2010 | **Martin Grubinger & Monks Of the Benedictine Abbey Münsterschwarzach**:<br>Voices: Benedictine Abbey Münsterschwarzach<br>sixxen: Martin Grubinger | *Communio: Pascha Nostrum Immolatus Est Christus* (2010) | Martin Grubinger | Drums 'N' Chant | Deutsche Grammophon |  |

***Tab. 11-4***. Cont.

| | | | | | | |
|---|---|---|---|---|---|---|
| 2012 | **Les Percussions de Strasbourg**: Bernard Lesage, Christian Hamouy, Claude Ferrier, Jean-Paul Bernard, Keiko Nakamura, Olaf Tzschoppe | *Le livre des claviers* (1988/1989)<br>*Khnoum* (1990)<br>*Les Arpenteurs* (2007) | P. Manoury<br>F.-B. Mâche<br>François Paris | 50th Anniversary | Accord / Universal Music France |  |
| 2015 | **Slagwerk Den Haag**: Fedor Teunisse, Niels Meliefste, Pepe Garcia, Joey Marijs, Frank Wienk | *Venus* (2010) | Rosalie Hirs | SIX | Slagwerk Den Haag |  |
| 2016 | **Leszek Lorent Percussion Ansamble siXen** | *Idmen B* (1985) | Iannis Xenakis | Tonisteon (τονιστέον) | Requiem Records |  |
| 2016 | **Sixtrum**: João Catalão, Julien Compagne, Julien Grégoire, Philip Hornsey, Kristie Ibrahim, Fabrice Marandola | *De l'itération* (2012) | Philippe Leroux | De la percussion | Soupir Editions |  |
| 2017 | **Noetinger, Pateras, and Synergy Percussion**: Timothy Constable, Joshua Hill, William Jackson, Mark Robinson, Leah Scholes, Bree Van Reyk | *Beauty will be amnesiac or will not be at all* (2013) | Anthony Pateras | Beauty will be amnesiac or will not be at all | Immediata |  |
| 2017 | **Third Coast Percussion**: Gregory Beyer, Owen Clayton, Ross Karre, Sean Connors, Robert Dillon, Peter Martin, David Skidmore | *Le livre des claviers* (1988/89)<br>*Métal* (1995) | P. Manoury | The Book of Keyboards | New Focus Recordings |  |
| 2018 | **Drumming**: Miquel Bernat (Dir.), João Dias, Saulo Giovannini, Pedro Oliveira | *Intra* (2017) | Mark Fell | Mark Fell Intra | Boomkat Editions |  |
| 2019 | **Bendik HK** | *Black Dino* (2019)<br>*Glacier Blue Skylark*<br>*Grey E Master*<br>*Dark Green 51* | Bendik Hovik Kjeldsberg | Depot | Mutual Intentions |  |
| 2019 | **Drumming**: Miquel Bernat (Dir.), João Cunha, Pedro Oliveira, Rui Rodrigues | *Steel factory* (2006) | Luís Tinoco | Archipelago | Odradek records |  |
| 2019 | **Speak Percussion**: Eugene Ughetti (Cond.) John Arcaro, Laura Holian, Lea Scholes, Matthew Horsley, Matthias Schack-Arnott, Peter Neville. | *Home Organs* (2000) | Thomas Meadowcroft | Percussion Works | Mode Records |  |
| 2020 | **Mr Untel** | *Sora* (2020)<br>*Kaiyō* (2020)<br>*K* (2020) | Gérard Langella | Extatic Dream | Elliot Music |  |
| 2020 | **Third Coast Percussion**: Sean Connors, Robert Dillon, Peter Martin, David Skidmore | *Quartered* (2017) | Ryan Lott | Quartered | Ryan Lott |  |

The album Minorities & Oddities was thus recorded by an ensemble of free improvisation, and

their percussionist, sound artist, and composer Gustavo Costa helped to construct the Sixxen prototype for the percussion ensemble Drumming (Portugal). He later constructed a unity with materials from the experiments and the construction of the last one, calling it a "mutated sixxen". As he stated:

> I helped build a sixxen for Xenakis' *Pléïades*, I think in 2000 or 2001.
> Around that time, I incorporated some of the sixxen parts into my percussion set, which I used in many free improvisation concerts, such as with the Klank Ensemble. [...]
> What I used was not the original sixxen, but just parts of it, with metal bars tuned in thirds of a tone. Even today I still use metal bars in less conventional tuning systems, like the 43-tone harry partch.[10] (Gustavo Costa, email to author, July 30, 2022).

In a completely different approach, Bendik HK and Mr. Untel used a sampled Sixxen, and they used it in very distinct perspectives (techno, house, and lounge music mainly), giving a larger public the potential access to the hearing of the instrument, and a potential interest by another interpreters and composers. It is possible to visualize that many important labels distribute these albums all over the globe, considering both Table 11-3 and 11-4. This also demonstrates that more people would have access to it, which could amplify and diversify the applications of the Xenakian instrument in the interest of a larger public.

The data presented here expands the previous results and highlights an initial and prolific panorama of the production for the SIX-XEN. From these perspectives, it is visible that it was already incorporated in different contexts, including the orchestral, pop, and disco tendencies. Its presence in diverse artistic installations, films, drama plays, and ballets only reinforces the extent of its interest in different domains and tendencies. This data shows that percussionists are concentrated on constructing the instrument to play Xenakis and are also engaged in expanding a larger repertoire including it. This shows their double responsibility to establish the instrument, constructing it and implementing its potentiality as a musical object with more extensive applicability. The previous chapter discussed how the performers adapted the concept of an instrument to their interests and aesthetic perspectives. It is quite the same with the repertoire because they seek to expand their skills and previous experiences with innovative challenges. As addressed, the contributing composers to this specific literature are also responsible for expanding its sonorities and the notation for SIX-XEN. The instrument has over only 44 years of existence, and more will inevitably be produced. What was here described is only the beginning of a bigger panorama that will still be amplified. The potential was only scratched, the surface barely visible, and the future opened to much more.

[10] "Eu ajudei a construir um Sixxen para a peça pleiades do Xenakis, creio que em 2000 ou 2001. / Por volta dessa altura eu incorporei algumas peças do sixxen no meu set de percussão, que utilizei em muitos concertos de improvisação livre, como no Klank Ensemble. [...] / O que eu utilizava não era o sixxen original, mas apenas partes dele, com barras metálicas afinadas em terços de tom. Ainda hoje continuo a utilizar barras metálicas em sistemas de afinação menos convencionais, como o de 43 tons do harry partch." (Gustavo Costa, email to author, July 30, 2022).

# Final considerations

*Comment ne pas sentir le vertige des mondes insensés ou sensés*
*que le musicien côtoie inlassablement, en sourd ou en aveugle,*
*qu'il effleure, parce qu'ils sont là, ou*
*qu'il aurait pu susciter et créer parce que, lui, est là* [?]
Iannis Xenakis (1994, p. 93)

The present research has essentially addressed three main elements of discussion: 1) a piece (*Pléïades*); 2) an instrument created specifically for it – the SIX-XEN as concept and the Sixxens as subsequent creations – and 3) a contextualization of both in terms of their origins and interconnections with Indonesian traditions based on interests, interactions, exchanges and experiences that characterized part of Iannis Xenakis' life. The discussion highlighted numerous elements that unveil important parts of the original creative process of *Pléïades* (in terms of micro and macrocomposition), which led to imagine a sonority that could characterize a then-new instrument. These observations thus generated propositions of practical applications in music as a development of specific artistic interests and approaches. After bringing to light the contributions of the present work, these final considerations will address its future potential ramifications regarding the composer, the piece, the instrument and artistic development.

In terms of the compositional approaches by Xenakis, it is important to consider that several elements noted here could reveal a new perspective about him and his production. Different authors have mentioned an interaction with Indonesian traditions that would have inspired Xenakis and his work, but these references were superficial and without profound analysis of historical sources. Based on the present discussion, it is clear that this contact had significant impact by penetrating deeper layers of his creative process, significantly altering his way of producing, and giving him materials to be developed for over ten years. Previously, only *Jonchaies* (1977) and *Pléïades* (1978) were referred to as pieces with some Balinese or Javanese characteristics, even in almost anecdotal references. Now, it is evident that a wider production from at least *Retours-Windungen* (1976) until *Kassandra* (1987) could attest these characteristics and must be considered in light of the impacts that Xenakis' Indonesian trip stimulated in his composition. This could even point out the necessity to analyze more pieces and reveal the intensity of the Indonesian connections in a larger context of his life. A specific review of part of his production in a new context is crucial and puts well-known pieces in a necessary up-to-date perspective.

Doing a preliminary overview, it must be noted that structures connecting his pieces with Indonesian traditional aspects permeates at least thirteen works (including pieces in which a first hearing and sighting in the scores already highlighted an intense framework of connections), characterizing at least eleven years on his production. If considering only the pieces from *Metastaseis* (1953-1954) until *O-mega* (1997), this span would be one fourth of the time he composed, and could represent an important part of what he created during this prolific stage of production. Even

acknowledging the intensive research already existing on this phase, it requires more attention and investments to be fully analyzed from this new standpoint. What was here presented is only the beginning of a re-dimensioning of this period in his biography. In this way, the in-depth study of the Indonesian consequences in Xenakis' work could point out more examples of the different ways the composer managed to include direct and indirect references in his pieces. More than only pointing references, it may allow for a better comprehension of his work and creative process, as well as his concepts in a post-WWII and based on post-colonial perspectives.

It is clear that Xenakis had been interested in the discussion of universals in music since the 1950s (as attested in his notebooks) and that the use of mathematics, as well as the integration of architecture, physics and biology, was a way to find parallels between the same principles in different domains. Being a universalist, of which he expressed in several interviews, he integrated the non-European music as part of his point-of-view[1]. Many times, he affirmed that music of different countries shared historical processes and that some of their structures could share the same origins, which would justify their use as common materials in his work. In this way, he believed that Japan, Indonesia and Greece could be referred as having common traits and common musical characteristics[2]. Having studied with Messiaen in the 1950s and participated in many events in Asia during the 1960s and 1970s, a growing intellectual production pointed to his objectives searching for universal structures[3]. In terms of Xenakis' personal life, his interests in Indonesian performative arts were never so deeply and precisely described as in this research, independently if it was as *ex situ* interactions or *in situ* experiences.

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[1] A statement to summarize this is when he mentioned that: "Musical universes, whether classical, contemporary, pop, folk, traditional, avant-garde, etc., seem to form autonomous units, sometimes closed, sometimes intercommunicating. They present surprising characteristics of diversity that explain why they are rich in new creations, but also in fossilizations, ruins and deserted expanses; and all this is perpetually in formation and in transformation; like clouds, the musical universes are differentiated and ephemeral. / This is because music is a socio-cultural phenomenon; consequently, it is linked to a given period of history. Nevertheless, it is possible to distinguish parts that are more stable than others; these constitute materials that are more or less hard, depending on the period of civilization from which they come; materials that move in space, that are created, launched, pushed by currents of ideas, that collide, influence, annihilate or fertilize each other." As originally stated: "Les univers musicaux, qu'il s'agisse de la musique classique, contemporaine, pop, folklorique, traditionnelle, d'avant-garde, etc., semblent former des unités autonomes, parfois closes, parfois intercommunicantes. Ils présentent de surprenants caractères de diversité qui expliquent qu'ils soient riches en créations nouvelles, mais aussi en fossilizations, en ruines et en étendues désertes ; et tout cela est perpétuellement en formation et en transformation ; comme les nuages, les univers musicaux sont différenciés et éphémères. / Ceci s'explique par le fait que la musique est un phénomène socio-culturel ; en conséquence, elle est liée à une période donnée de l'histoire. Néanmoins, il est possible d'y distinguer des parties plus stables que d'autres ; celles-ci constituent des matériaux plus ou moins durs selon l'époque de civilisation d'où ils proviennent ; des matériaux qui se déplacent dans l'espace, qui sont créés, lancés, poussés par des courants d'idées, qui se heurtent, s'influencent, s'annihilent ou se fécondent les uns les autres." (Xenakis, 1994, p. 15).

[2] See more details in his interview to Varga (1996).

[3] As mentioned by Veneración (1967, p. 108), the composer "felt that there seemed to be a confusion in music which may be resolved by seeking for a universal structure", and from this event on (Musics of Asia—International Music Symposium in Manila, 1966) perceptible consequences are present in his work (being it intellectual and practical). See more details in Chapter 1–Section 1.1.4.

The present text then attests that, from the second half of the 1970s onward, Xenakis reintegrated in his compositional process elements and concepts which had been pivotal for his artistic development in the previous decades. *Pléïades*, in this complex context of at least 25 years of production since *Metastaseis*, is a piece in which Xenakis achieved numerous applications of the "universal structures" that he had sought for so long. Not only because he used timbres, pitch collections and formal aspects of a different culture completely integrated to his approaches, but also because he returned to previous materials (such as his gamelan recording of 1951 and his personal *in situ* recordings of 1972-1973 in Bali) and directly inserted these references in his piece. The composer chose to include literal excerpts of recordings, and attested that in his work, diverse structural materials could be integrated by the use of rational processes, even if originated from other cultures and regions. This kind of patchwork in *Pléïades* highlights old interests of the immigrant in the 1940s (searching for his own references by assimilation of the most diverse cultures), the student composer of the 1950s (when his first chamber pieces started to appear with more modal characteristics), and also the already recognized composed of the 1960s (interested to participate in international events all over the globe).

Xenakis addressed a written homage to the Hungarian composer Béla Bartók with two other authors, Andrzej Panufnik and Alberto Ginastera, being each one responsible of part of the publication. Xenakis' specific text appears so clearly applicable to himself when considering *Pléïades*, that with the replacement of the words "European East" by Europe, it could be considered an elegy to part of the Xenakian approach in this period. As he stated:

> BÉLA BARTÓK has had a deep love for the wisdom of the traditional cultures of the peoples of the European East and beyond. This love has been forged by tirelessly searching for the sources and specific authenticities of each region. But here are the differences that create specific values. [...] He was able to broaden the vision of music by relying on a triple approach: a) that of exploration, of knowledge of the forms and formulas of the traditions of the various cultures of the peoples, b) that of the harmonic and contrapuntal heritage of 'cultivated' music, c) that of the effort of abstraction which alone can lead to a planetary universality.[4] (Panufnik, Ginastera, & Xenakis, 1981, p. 5).

The Xenakis of the 1970s has much in common with the Xenakis of the 1950s[5] — the fact that he used a recording that had been crucial for him in this decade in the making of *Pléïades* seems extremely significant. This whole situation and the relationship with music from Indonesia is not

[4] "BELA BARTOK a eu un amour profond pour la sagesse des cultures traditionnelles des peuples de l'orient Européen et de plus loin encore. Cet amour il se l'ait forgé en cherchant inlassablement les sources et les authenticités spécifiques de chaque région. Or ici sont les différences qui créent les valeurs spécifiques. [...] Il a su donc élargir la vision de la musique en s'appuyant sur une triple démarche : a) celle de 1'exploration, de connaissance des formes et ses formules des traditions de diverses cultures des peuples, b) celle de 1'héritage harmonique et contrapuntique de la musique 'savante', c) celle de l'effort d'abstraction qui seul peut conduire à une universalité planétaire." (Panufnik, Ginastera, & Xenakis, 1981, p. 5).

[5] Referred as the "Bartókian Xenakis" by some authors: Mâche (1993), Solomos (1996; 2001), Harley (2004), Barthel-Calvet (2012), among others. Solomos (2001b) mentioned even a difference between a "Bartókian Xenakis" ("Xenakis bartókien") and the "Xenakis of maturity" ("Xenakis de la maturité").

anecdotal. On the contrary, due to the amount of direct and indirect references in the piece, it is conscious — literally calculated. And it was strongly motivated by the fact that he observed Indonesian traditions *in situ*, a fundamental shifting factor that stimulated his artistic process.

Although Xenakis' trip to Indonesia in 1972-1973 was briefly mentioned in previous biographies about the composer, the present discussion is the first in-depth account about this specific moment of his life. Having direct evidence of its impact on specific compositional approaches, this trip should be better studied as a source of information not only about Xenakis, but also about two other important composers of the 20th century which were part of the same expedition: Toru Takemitsu and Betsy Jolas. It is certain that they did not perceive or experience the event similarly or evolve the same way in relation to what they saw there. Having interviewed Jolas regarding this experience, it is certain that a research on this trip will present an important discussion about the three composers and highlight a broader panel of their production, pointing out even more points of contacts between them than previously expected. With this interview and all the documents collected for the present dissertation (representing only part of what could be consulted at this point), direct information from important primary sources can still appear and potentially reveal new perspectives about these figures and their creative processes.

This trip can highlight an important part of avant-garde history because it reunited essential figures of the 20th century music not only as composers (Jolas, Takemitsu, Xenakis), but also as festival directors, critique writers and musicologists (Maurice Fleuret and Henry-Louis de La Grange) and interpreter (Marie-Françoise Bucquet). The festival directors (Fleuret and La Grange) promoted several important events, commissioned many pieces, stimulated various ensembles and worked on the creation of many spectacles. They contributed to an important part of the French scene, and their connections and contributions were present well over the limits of this country. Maurice Fleuret also worked in the French Ministry of Culture and, as Director of Music and Dance from 1981 to 1986, he was an eminent figure stimulating the vanguardist perspectives on different fronts. It is therefore clear that the trip represents a major event of cross-cultural exchanges, contributing to the understanding of the presence of non-European traditions in vanguardist approaches. As a result, the study of these three composers with so different origins, biographies and approaches would be a source of important and profound data.

In the context of all previous considerations emerges *Pléïades*, a piece so singular that it would incentivize Xenakis to conceive a new instrument, of which he personally participated in the construction of many prototypes. A rich overview of the historical context of the piece with data and sources that had not been previously addressed was here presented. It is possible to understand that the work was commissioned for a specific ballet setting, being initially thought as an accompaniment music (a mix of incidental music and programmatic music). However, Xenakis pushed to have

complete independence of his production, aware that its importance would reach far beyond the specificity of one unique production for a dance spectacle. This piece must now be redefined in his biography, not only because it incorporates the only complete acoustic instrument that he created but also because it is a singular amalgam between his most representative theoretical and practical approach. This piece illustrates clearly his most characteristic processes and tools of the late 1970s, and it could characterize a great part of his work of the first half of the 1980s, being an epitome of his creative process during his most prolific period of production, be it tied to percussion instruments or not.

*Pléïades* represents a coherent whole, a work integrally dedicated to the maximum diversification by microvariations and to the massive presence of "unfaithful repetitions". The textures, shapes, timbres, harmonic/melodic treatments, forms, «*Mélanges*» in its main principle (a variation of previous excerpts), internal differences of the SIX-XEN and different prototypes of Sixxen constructed are all consequential of one process, the replication of non-equal copies[6]. Considering it in this way, the subsequential constructions of the SIX-XEN and each one of the later interpretations of *Pléïades* is part of this eternally varying piece. This could even explain why Xenakis — continuously fighting against the inertia — had never indicated a unique and sole Sixxen as the model reference.

To achieve this intricate coexistence of multiplicity that characterizes *Pléïades*, Xenakis elaborated variations from the tiniest intrinsic structures (by defining, for instance, the minute differences between sixxens) to the bigger ones (such as the differences between periods of the sieve used, the melodic variations in wave form structures and arborescent materials, or the principle of recapitulative variations of «*Mélanges*»). He then superposed unfaithful repetitions in layer upon layer. The use of a specific heterophonic texture previously created by Xenakis — the sound halo — is simply another application of the same principle in terms of a macrostructure and, in *Pléïades*, is developed to its full potential.

Different musical structures in *Pléïades* pointed to certain correlations with Indonesian traditions and the historical research here developed highlighted numerous important aspects of Xenakis' life. Various documents consulted brought evidence that direct connections with gamelan music and instruments were part of the composer's creative process. This evidence demonstrated that the famous "pelog scale", present in the sieve he developed for *Jonchaies* and *Pléïades* (later reused in other pieces), was a direct insertion of a gamelan scale he recorded in 1972 in Northern Bali. The historical material also showed that the composer even used a recording as the basis for the composition of an entire section in «*Claviers*» — the one he had been keeping in his personal

[6] Or as the composer himself indicated: "the idea of periodicity, repetition, duplication, recurrence, copy, faithfulness, pseudo-faithfulness, unfaithfulness." (Xenakis, 1979, p. i).

collection since 1951. Both examples are phenomena that had not been previously observed in Xenakis' ways to proceed. He is well-known for reusing material he himself developed, but this kind of insertion of exogenous materials in his work is rare.

Indirect correlations with Indonesian musical traditions also reinforce the intense presence of an imaginary turned to this South-Eastern archipelago. In this way, polyphonic structures similar with those characteristically used in the *kotekan* and with colotomic instruments, as well as some heterophonic textures and contrasting speed differences all over the piece, could reiterate the strong presence of Balinese and Javanese elements. A massive presence of metallic timbres (in a clear opposition between pitched instruments–vibraphones–and unpitched ones–the SIX-XEN) and the emphasis that metallic instruments received in «*Claviers*», «*Métaux*» and «*Mélanges*» is also indicative of the consequences of the trip to Indonesia. In this perspective, the SIX-XEN has a central role in the timbre qualities of the piece and the heterogeneity in terms of tuning systems among the percussion keyboards, which is specifically what Xenakis tried to convey when he wrote the description for the construction of the instrument. His acoustic instrument is thus very consequential of the journey he made to Bali and Java while representing his most important individual interests in composition. It promotes a dialogue between particular traits present in his production (in terms of glissandi, beating effect, microtonal relations, and clusters) and a tradition that has, as he himself expressed many times, thousands of years of experience constructing instruments and playing music.

It is significant that, when invited to compose for a ballet, Xenakis conceived an instrument that would synthesize his personal approach and compositional preferences while having many affinities with the gamelan metallophones. In Bali and Java, he experienced several performances with dance (among them the traditions of the Rejang, Legong, Gambuh, Reog, Topeng, Wayang wong), as highlighted by the drawings that he made of traditional performative arts, by the recordings he and Maurice Fleuret produced, as well as the statements made during specific interviews (see Xenakis, 1973). Then, when commissioned to write a ballet, his interest in Indonesian references blossomed. The composer had studied and showed affinity for these traditions as seen in previous pieces (with *Retours-Windungen* and *Jonchaies*), but when the creative process of *Pléïades* started, a missing link in the percussive instrumentarium motivated him to conceive his own musical object. This missing item was not a gamelan, a percussion keyboard nor an unpitched percussion, but rather something in between and an amalgam of part of each one of these categories. In this way, the instrument is also an epitome of *Pléïades*, reflecting the same principles that guide its structures, textures, melodic variations and other formal materials. The instrument reflects the whole concept of the piece and vice-versa; they manifest reciprocal conditions by intrinsic similarities. *Pléïades* and the SIX-XEN are resulting consequences of sequences of unfaithful repetitions being eternal metamorphic entities, existing in all diverse variations. With the variety of gamelan instruments that

he saw in Indonesia, he knew that a miscellaneous entity could be constructed with distinct metallic properties, forms, tunings and pitch aspects, while still saving the embodiment of a coherent musical object. In this way, he would still need the engagement of some active agents to the perpetuation of his idea: the percussion community.

I situated my own artistic research in these perspectives. I searched for the meanings that a practiced-based approach of the SIX-XEN could bring, guided by the interpretation of the existing repertoire and by collaborations which led to the constitution of new possibilities. I followed the path towards the potential Indonesian references of the SIX-XEN's origins that my research was indicating, which led me to focus on the contributions that the gamelan repertoire and its array of techniques could stimulate. This brought a number of personal discoveries and artistic evolution, while also contributing to the comprehension of the evidence and materials that the archival research and the analysis were treating, which shed a whole new light upon the very principle of the SIX-XEN.

In a groundbreaking way, Xenakis managed to define the proposal of an innovative instrument in very few paragraphs. The powerful cohesion of his synthetic textual description added to the freedom that characterizes his proposal encountered in the percussive community a fertile field of creativity. As previously indicated, the SIX-XEN is an instrument created by a composer but built almost integrally under the decisions of the interpreters, even in terms of its initial notation system, altered by the performers and improved by the continuous commissions that followed. The work of many ensembles allowed the emergence of a broad and diverse panorama of Sixxens and an interesting repertoire in perpetual expansion. The interpreters thus have a remarkable responsibility towards the instrument and Xenakis' legacy. However, this responsibility continues to evolve, as the interpreter must search for new possibilities, adapt it to their reality, and work with other composers for new pieces and potential applications. Their choices through the construction of their Sixxen will ultimately turn possible an object that embodies both the ensemble's perspectives about their sound research and their standpoint about Xenakis' thinking. By not indicating one exclusive model to base the construction of a Sixxen on, Xenakis consciously included the percussionists in his search for this eternal metamorphic entity that is the SIX-XEN. By adding to compositional variations the continual evolution induced by the perpetually renewed interpretations of *Pléïades* through time, a constantly mutating work of art has been conceived. In this perspective, all the potential choices that the composer offered for the performers also pass through the embodiment of variation from micro to macrolevels. The fact that the interpreters must build a Sixxen implies that they are responsible for variable timbral characteristics in a microlevel and, the fact that they can organize a personal order of the movements implies that they can act on more formal macrolevels of the piece.

As the composer made this construction an open process, there can only be interpretations and intentions to achieve a potential variation of Xenakis' requirements; as such, a final, determined and

unique product can never come to fruition. A unique Sixxen would be the antithesis of what Xenakis imagined as the SIX-XEN, being also the contrary of the very concept of the piece it was written for. With this open proposition, the composer allowed for a continuous renewal of *Pléïades*. It also allowed for a perpetual adaptation to the historical context in which the instrument is constructed and the piece interpreted. The whole concept of the open processes he used in his percussion works is deeply ingrained in the composer' philosophy, as he attested that "Originality is an absolute necessity for the survival of the human species"[7] (Iannis Xenakis, mail to Bob Wilson, October 29, 1999) and that unfaithful repetitions are "synonymous of life"[8] (Xenakis, 1994, p. 92). These statements are symptomatic of what both *Pléïades* and the SIX-XEN represented for him: a search for meanings of life, a drive to survive, to understand reality as well as the human being, and to find tangible reasons to exist and to capture the existence of humanity.

The SIX-XEN was created in a specific context but resulted in an atemporal concept. With an openness that allows for the extreme variability of its main characteristics, it will pass through the bonds of the period it was created. It will be constantly related to the music-making and, more important, to the meaning-making of the period in which it is constructed in, still fulfilling the conceptual expectations and the material possibilities of each generation of percussionists and composers. In itself, SIX-XEN is Xenakis' perpetuated act of trust towards the percussion community and their collective and creative research on timbre, as well as an infinite source of challenging perspectives to instrumental creation and performance.

[7] "L'originalité est une nécessité absolue de survie de l'espèce humaine." (Iannis Xenakis, mail to Bob Wilson, October 29, 1999).

[8] The context of the entire statement was: "But the infidelity of the reproduction, of the recurrence in the music, is synonymous of life, of aesthetic value of a sound, of a music. [...] To occupy the eternity of the space and the time, it is necessary the recurrence which is unfaithful. The music could be perceived under this rich angle, entirely, since the hundred thousandth of second, the sample, until the macroform of ten minutes." The original mention was: "Mais l'infidélité de la reproduction, de la récurrence dans la musique, est synonyme de vie, de valeur esthétique d'un son, d'une musique. [...] Pour occuper l'éternité de l'espace et du temps, il faut la récurrence qui est infidèle. La musique pourrait être perçue sous cet angle richissime, entièrement, depuis le cent millième de seconde, l'échantillon, jusqu'à la macroforme de dizaine de minutes." (Xenakis, 1994, p. 92).

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# List of Figures

# List of Tables

# List of Appendices

# Appendices

# Appendix 1

**Description of the interviews by category, respondent and date(s).**

| Category | Respondent | Date of interview |
|---|---|---|
| **Percussionist** (ensemble) | Claude Ricou * (Les Percussions de Strasbourg) | 09/10/2019 |
| | Ewe Payeur * (Les Pléiades) | 13/06/2019, 21/05/2021 |
| | Gabriel Bouchet * (Les Percussions de Strasbourg) | 27/03/2020, 28/03/2020, 09/04/2020 |
| | Georges van Gucht * (Les Percussions de Strasbourg) | 17/04/2020, 18/04/2020 |
| | Jean-Pierre Drouet * (Trio Le Cercle) | 30/09/2018 |
| | Keiko Nakamura * (Les Percussions de Strasbourg) | 11/06/2019, 22/11/2020 |
| | Michael Rosen * (Oberlin College) | 30/03/2020, 27/05/2021 |
| | Pietro Bertelli * (Brake Drum Percussion) | 27/07/2022 |
| | Robyn Schulkowsky * | 31/01/2021 |
| | Roland Auzet * | 30/06/2020 |
| | Ruud Wiener * (Nieuwe Slagwerkgroep Amsterdam) | 21/04/2020 |
| | Sylvio Gualda * (Les Pléiades) | 13/01/2020, 17/04/2020 |
| | Brett Reed (Red Fish Blue Fish, UCSD) | 09/07/2020 |
| | François Papirer (Les Percussions de Strasbourg) | 30/04/2019 |
| | Jean Paul Bernard (Les Percussions de Strasbourg) | 17/06/2019 |
| | Minh-Tâm Nguyen (Les Percussions de Strasbourg) | 11/12/2018 |
| **Composer** | Betsy Jolas * | 22/01/2021, 13/05/2022, 21/06/2022 |
| | François-Bernard Mâche * | 06/03/2020 |
| | Philippe Manoury * | 28/01/2019 |
| | Annette Schlünz | 25/02/2020 |
| **Constructor** (company) | Claude Walter * (*Rythmes et sons*) | 04/02/2021 |
| | Domenico Melchiorre (Lunason) | 28/10/2019 |

**Legend:** * primary source

# Appendix 2

**Exchanges made by email, described by category, name and date of first exchange.**

| Category | Name | Date of first exchange |
|---|---|---|
| **Percussionist** (ensemble) | Anders Holdar * (Kroumata Percussion Ensemble) | 24/11/2020 |
| | James Wood * (England Percussion Festival 1988; Darmstadt) | 17/04/2020 |
| | Leif Karlsson * (Kroumata Percussion Ensemble) | 13/12/2020 |
| | Robert Aitken * (NMC) | 20/11/2020 |
| | Robert Becker * (NMC / Nexus) | 09/04/2020 |
| | Robyn Schulkowsky * | 20/01/2021 |
| | Shiniti Ueno * (Makoto Aruga Percussion Group) | 23/09/2019 |
| | Takaya Nakatani * (Makoto Aruga Percussion Group) | 20/12/2019 |
| | Amund Sjølie Sveen (Gothenburg Percussion Group) | 27/11/2020 |
| | Anno Kesting (Percussion Art Quartet) | 23/02/2021 |
| | Christoph Brunner | 20/01/2021 |
| | David Pye (Nova Ensemble) | 21/11/2018 |
| | Erik Dæhlin (Gothenburg Percussion Group) | 2/12/2020 |
| | Gert Mortensen (Copenhagen Percussion Ensemble, Percurama) | 26/11/2020 |
| | Günter Meinhart (Studio Percussion) | 21/01/2021 |
| | Gustavo Costa (Klank Ensemble) | 30/07/2022 |
| | Håkon Stene | 18/09/2020 |
| | Hans Petter Vabog (Norwegian Armed Forces' Band North) | 2/12/2020 |
| | Jean Paul Bernard (Les Percussions de Strasbourg) | (30/05/2016) 16/05/2019 |
| | Louise Devenish (University of Western Australia) | 21/11/2018 |
| | Olivier Membrez (Usinesonore) | 21/01/2021 |
| | Paul Tanner (Nova Ensemble) | 13/05/2022 |
| | Pedro Carneiro | 25/03/2022 |
| | Thomas Meisner (Schlagquartett Köln) | 20/01/2021 |
| | Thomas Nilsson (SISU Percussion ensemble) | 18/11/2020 |
| | Tilo Bogler (*Zürcher Hochschule der Künste*) | 22/01/2021 |
| | Wolfram Winkel (Ensemble für percussive Kunst München) | 16/02/2021 |
| **Composer** | Anthony Pateras | 04/11/2018 |
| | Cassiopeia Sturm | (16/04/2016) 14/10/2019 |
| | Lutz Glandien | 30/03/2020 |
| | Rozalie Hirs | 22/06/2019 |
| | Thomas Meadowcroft | 14/02/2021 |

***Appendix 2***. Cont.

| | | |
|---|---|---|
| **Constructor** (company) | David Alaime (Bergerault *) | 19/02/2020 |
| | Gaetan La Mela (RoGa Percussion) | 24/01/2021 |
| | Jonathan Mynette (Bell Percussion) | 15/04/2020 |
| | Paul Gueib (ENSAM / Thinktone / *Rythmes et Sons*) | 03/08/2022 |

**Legend:** * – primary source (_____) – first contact established previously to the present research work

# Appendix 3

**Complete table with information about Sixxen prototypes constructed.**

| Country | Institution / Ensemble / Artist –Company | Metal | Bar profiles | | | | | | | S | P | R |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Angle / Inverted U | | Tube | | | Plate | Channel / Inverted L | | | |
| | | | equal sides | unequal sides | square | rectange | round | | | | | |
| USA (25) | Arizona State University | Aluminum | | ■ | | | | | | 2 | | |
| | Baylor University/Line upon Line/Meehan-Perkins Duo | Aluminum | | ■ | | | | | | 2 | | |
| | Cassiopeia Sturm | Aluminum | | ■ | | | | | | 1 | | |
| | Chamber Cartel | Aluminum | | ■ | | | | | | 2 | | |
| | Clocks in motion | Aluminum | | ■ | | | | | | 1 / 2 | | |
| | Crossing 32nd Street | Aluminum | | ■ | | | | | | 2 | | |
| | Eastman School of Music | Aluminum | | ■ | | | | | | 1 | | |
| | Garrett Mendelow | ? | | | | | | | | | | |
| | Jacaranda percussion ensemble | ? | | | | | | | | | | |
| | Joshua Dreyer | Aluminum | | ■ | | | | | | 1 / 2 | ■ | |
| | Lagan Percussion | Aluminum | | ■ | | | | | | 2 | | |
| | L.A Percussion Rental * | Aluminum | | ■ | | | | | | 1 / 2 | | |
| | Oberlin College | Stain. steel | | | ■ | | | | | 2 | | |
| | Queens College–CUNY | Aluminum | | ■ | | | | | | 2 | | |
| | Rowan University | Aluminum | | ■ | | | | | | 1 | | |
| | SO Percussion / Meehan-Perkins Duo | Aluminum | | | ■ | | | | | 2 | | |
| | Stony Brook University / Juilliard Percussion Ensemble | Aluminum | | ■ | | | | | | 2 | | |
| | Talujon | Aluminum | | ■ | | | | | | 2 | | |
| | Third Coast Percussion | Aluminum | | ■ | | | | | | 1 | ■ | |
| | University of California San Diego / Red Fish Blue Fish / Echoi Ensemble | Aluminum | | ■ | | | | | | 2 | | |
| | University of North Carolina at Greensboro | Aluminum | | ■ | | | | | | 2 | | |
| | University of Tennessee Knoxville | Aluminum | | ■ | | | | | | 1 / 2 | | |
| | University of Texas at Austin | Iron | | ■ | | | | | | 1 / 2 | | |
| | University of Wisconsin Madison / Madison Percussion Group | Aluminum | | ■ | | | | | | 2 | | |
| | Yale University | Aluminum | | | ■ | | | | | 2 | | |

*Appendix 3*. Cont.

| Country | Institution / Ensemble / Artist | –Company | Metal |  | S | P | R |
|---|---|---|---|---|---|---|---|
| France (9) | Conservatoire de Lyon | | ? | | | | |
| | | I–Kolberg | Brass | | 1 (V) | | |
| | | II–Kolberg / Rythmes et Sons | Brass | | 2 | | |
| | Les Percussions de Strasbourg | III–Grimus | Dural | | 2 | | |
| | | IV–Yamaha | Stain. steel | | –unfinished prototype– | | |
| | | V–ENSAM / Thinktone / Rythmes et Sons | Dural | | 2 | | |
| | Les Pléïades & Sylvio Gualda | I–Bergerault | Aluminum | | 1 (C) | | |
| | Les Pléïades & Sylvio Gualda / Conservatoire de Saint Cloud / Percussions de l'Orchestre National de France / Trio Xenakis | II–Bergerault | Aluminum | | 2 | | |
| | Symblema Percussions | | ? | | | | |
| Germany (7) | Hoschule für Musik Freiburg | –Lunason | Aluminum | | 2 | | |
| | Hoschule für Musik und Darstellende Kunst Frankfurt am Main | | Aluminum | | 2 | | |
| | Hochschule für Musik und Theater „Felix Mendelssohn Bartholdy“ Leipzig | | Aluminum | | 2 | | |
| | Musikhochschule Lübeck / MHL-Schlagzeugensemble | –Lunason | Aluminum | | 2 | | |
| | Percussion Art Quartet / Hochschule für Musik und Theater München / Ensemble für percussive Kunst München | | Iron | | 2 | | |
| | Schlagquartett Köln | | Aluminum | | 2 | | |
| Australia (5) | Nova Ensemble | | Aluminum | | 2 | | |
| | Synergy Percussion Group | | Aluminum<br>Iron<br>Iron | | 2 | | |
| | Taikoz | | Aluminum | | 1 / 2 | | |
| | University of Melbourne | | Steel | | 1 | | |
| | University of Western Australia | | Steel | | 2 | | |

*Appendix 3*. Cont.

| Country | Institution / Ensemble / Artist –Company | Metal |  | S | P | R |
|---|---|---|---|---|---|---|
| Canada (4) | NMC / Nexus | Steel | | 2 | | |
| | NYO Canada / Wilfrid Laurier University | Aluminum | | 2 | | |
| | Sixtrum | Aluminum | | 2 | | |
| | TorQ Percussion Quartet | Aluminum | | 2 | | |
| Netherlands (4) | Nieuwe Slagwerkgroep Amsterdam –Pustjens Percussion | Aluminum | | 1 | | |
| | Percussive Rotterdam | Aluminum | | 2 | | |
| | Slagwerk Den Haag | Aluminum | | 2 | | |
| | Tromp Laureates | Aluminum | | 2 | | |
| Switzerland (4) | Centre International de Percussion de Genève / Eklekto / Usine Sonore | Aluminum | | 2 | | |
| | Decibells –Lunason | Aluminum | | 2 | | |
| | Lunason * | Aluminum | | 2 | | |
| | Zürcher Hochschule der Künste / Ensemble Arc-en-ciel / Cosmic Percussion Ensemble –Giannini Swiss Drums | Stain. steel | | 2 | | |
| United Kingdom (3) | 4-Mallety | Aluminum | | 1 / 2 | | |
| | Bell Percussion * | Aluminum | | 1 / 2 | | |
| | Red Note Ensemble / Tom Hunter | Aluminum | | 2 | | |
| Japan (3) | Kuniko Kato | Stain. steel | | 2 (C) | | |
| | Makoto Aruga Percussion Ensemble | Steel | | 1 | | |
| | University of Tokyo –Lunason | Aluminum | | 2 | | |
| Belgium (2) | Koninklijk Conservatorium Brussel –RoGa Percussion | Aluminum | | 1 / 2 | | |
| | RoGa Percussion * | Aluminum | | 1 / 2 | | |
| Brazil (2) | Instituto Federal de Goiás (IFG) / Impact(o) / GruLaPe | Stain. steel | | 1 | | |
| | Universidade Federal de Goiás (UFG) / Impact(o) | Stain. steel | | 1 | | |
| Spain (2) | Arxis Ensemble | Aluminum | | 2 | | |
| | Neopercusión | Steel | | 2 | | |
| Denmark (2) | Copenhagen Percussion Ensemble | ? | | | | |
| | Percurama / Gert Mortensen | Stain. steel | | 2 | | |
| Mexico (2) | Universidade de Guanajuato / PercUG / Grupo de Percusión de Monterrey / Academia Cervantina / Ivan Manzanilla | Aluminum | | 2 | | |
| | Tambuco | Aluminum | | 2 | | |

*Appendix 3*. Cont.

| Country | Institution / Ensemble / Artist | –Company | Metal |  | S | P | R |
|---|---|---|---|---|---|---|---|
| Poland (2) | Sixen Group | | ? | | | | |
| | Warsaw Percussion Group | | ? | | 2 (C) | | |
| Portugal (2) | Drumming | | Aluminum | | 2 | | |
| | Pedro Carneiro | | Aluminum | | 2 | | |
| Sweden (2) | Gothenburg Percussion Group | | Aluminum | | 2 | | |
| | Kroumata Percussion Group / Stockholm Percussion Group | –Grimus | Dural | | 2 | | |
| Argentine | Teatro Colón / Tambor Fantasma | | Aluminum | | 1 / 2 | | |
| Austria | Percussive Planet / Martin Grubinger | | Aluminum | | 2 | | |
| Finland | Echo Percussion / Sibelius Academy | –Rudolph Percussion | Aluminum | | 2 | | |
| Greece | Typana Percussion Ensemble | | ? | | | | |
| Italy | Brake Drum Percussion | –Ufip | Aluminum | | 2 | | |
| | | | Brass | | | | |
| | | | Bronze | | | | |
| | | | Iron | | | | |
| Latvia | Perpetuum Ritmico Ensemble | | Iron | | 2 | | |
| Norway | Norwegian Armed Forces' Band North | | Aluminum | | 1 / 2 | | |

**Legend:**

***** – company renting a Sixxen
**?** – information not founded

**S** – spatial disposition of bars
**P** – presence of pedal
**R** – presence of resonators

**V** – vertical disposition
**C** – continuous layout

# Appendix 4

**Complete table with information about the repertoire requiring the SIX-XEN.**

| Year | Title | Composer (Country) | Instrumentation | Length | Edition | Observation | Commission by |
|---|---|---|---|---|---|---|---|
| 1978 | *Pléïades* | Iannis Xenakis | Sixxen and Sixxen with other instruments | 48’ | Salabert | Sixxen required in two movements («*Métaux*» and «*Mélanges*») | L.P.S. |
| 1985 | *Idmen A B* | Iannis Xenakis | sextet and choir (1 or 2 sixxens) | 10’ | Salabert | sixxen(s) not imposed in two excerpts of *Idmen B* | L.P.S., Europa Cantata |
| 1987-1988 | *Le livre des claviers* («*III*», «*VI*») | Philippe Manoury (FRA) | Sixxen | 3’ and 6’40” | Éd. Durand | Sixxen required in two movements («*III*» and «*VI*») | L.P.S. |
| 1990 | *Khnoum* | François-Bernard Mâche (FRA) | sampler and percussion quintet (1 sixxen) | 16’30” | Éd. Durand | with sixxen sounds sampled | L.P.S. |
| 1993 | *Junkelan* | David Pye (AUS) | quartet (4 sixxens) | 35’ | unpublished | | N.E. |
| | *L’Estuaire du temps* | François-Bernard Mâche (FRA) | soloist and orchestra | 29’ | Éd. Durand | with sixxen sounds sampled | Radio France |
| 1994 | *Et la pluie se mit à tomber* | Annette Schlünz (DEU) | sextet (4 sixxens) | 13’51” | Boosey & Hawkes | | L.P.S. |
| | *Sechse kommen durch die Welt* | Lutz Glandien (DEU) | Sixxen | 15’ | unpublished | | L.P.S. |
| 1995 | *Métal* | Philippe Manoury (FRA) | Sixxen | 25’ | Éd. Durand | | L.P.S. |
| 1996-1997 | *Music of Mercy Pt.3* | Peter Adriaansz (USA) | sax quartet and sextet (1 sixxen) | 18’ | Donemus | | S.D.H. |
| 1998 | *Interregna* | Mark Osborn (USA) | sextet (Sixxen) | 9’30” | unpublished | | R.F.B.F. |
| | *Los* | Jean-Marc Chouvel (FRA) | Sixxen | ? | Fondation Royaumont | | L.P.S. |
| | *Sol* | Jean-Marc Chouvel (FRA) | sextet (Sixxen) | 5’ | Fondation Royaumont | | L.P.S. |
| 1999 | *Sous-développement mental, hommage à mon pays* | Harold Vasquez Castañeda (COL) | sextet (?) | ? | unpublished | | L.P.S. |
| 2000 | *Home organs* | Thomas Meadowcroft (AUS) | sextet (1 sixxen) | 12’20” | Australian Music Center | | L.P.S. |
| | *Journey of the Magi* | James Wood (GBR) | large ensemble (1 sixxen) | 18’ | James Wood Ed. | | L.P.S., Festival Musica, NEM |
| 2001 | *Access* | Claudio Baroni (ARG) | organ, violin and percussion sextet (Sixxen) | ? | Donemus | | S.D.H. |
| | *Répliques* | Jean-Louis Agobet (FRA) | Sixxen | 12’ | Éd. Jobert | | L.P.S. |

***Appendix 4***. Cont.

| Year | Title | Composer (Country) | Instrumentation | Length | Edition | Observation | Commission by |
|---|---|---|---|---|---|---|---|
| 2002 | *The Drummers of Gilgamesh* | David Pye (AUS) | narrator and large ensemble | ? | unpublished | | N.E. |
| 2003 | *Envoûtements VI* | Suzanne Giraud (FRA) | sextet (4 sixxens) | 17’ | Éd. Henry Lemoine | | L.P.S., Festival Musica |
| 2004 | *à.X.* | Daniel A. Weymouth (USA) | Sixxen and oboe | 13’ | unpublished | | |
| | *Shadowtime* | Brian Ferneyhough (USA) | opera (1 sixxen) | 120’ | Edition Peters | | |
| 2005 | *Adygea* | Klank Ensemble (PRT) | septet (1 sixxen) | ? | not based on notation | | K.E. |
| | *Ghodoberis* | Klank Ensemble (PRT) | septet (1 sixxen) | ? | not based on notation | | K.E. |
| | *Payoniiya-tsuro* | Klank Ensemble (PRT) | septet (1 sixxen) | ? | not based on notation | | K.E. |
| | *Senza* | François Paris (FRA) | sextet (2 sixxens) | 10’ | Gérard Billaudot | | L.P.S. |
| | *Talyshes* | Klank Ensemble (PRT) | septet (1 sixxen) | ? | not based on notation | | K.E. |
| | *Udmurtia* | Klank Ensemble (PRT) | septet (1 sixxen) | ? | not based on notation | | K.E. |
| | *Waves To Be Beaten, Conquer The Horizon* | Erik Daelhin (NOR) | duo (2 sixxens) | 8’ | unpublished | with tape | |
| | *Zzyzx* | Klank Ensemble (PRT) | septet (1 sixxen) | ? | not based on notation | | K.E. |
| 2006 | *Steel Factory* | Luís Tinoco (PRT) | quartet | 10’40” | unpublished | steel drums, bongos and 3 bars of sixxen to each player | Drumming |
| | *Toy* | Oscar Strasnoy (ARG) | piano and percussion quintet (1 sixxen) | 15’ | unpublished | | L.P.S. |
| 2007 | *Le petit bossu* | James Wood (GBR) | trio (3 sixxens) and recitant | 40’ | James Wood Ed. | Text: Yves Lenoir | L.P.S. |
| | *Les Arpenteurs* | François Paris (FRA) | sextet (2 sixxens) and tape | 90’ | Gérard Billaudot | spectacle with tape and ballet (choreographer: Michèle Noiret) | L.P.S. |

***Appendix 4***. Cont.

| Year | Title | Composer (Country) | Instrumentation | Length | Edition | Observation | Commission by |
|---|---|---|---|---|---|---|---|
| 2007-2008 | *Feedback* | Marco-Antonio Perez-Ramirez (CHL) | sextet (Sixxen) | 17’ | Editions Jobert | with live electronics | L.P.S. |
| | *Cloc Ar Y Dwr* | Jack White (GBR) | duo marimba, piano and tape (1 sixxen) | 11’44” | unpublished | with tape (sixxen recorded) | |
| 2009 | *ICO* | Wolf Edwards (CAN) | sextet (Sixxen) | 10’15” | unpublished | | Sixtrum |
| | *Trigger/Switch/Filter* | Alex Mincek (USA) | sextet (2 sixxens) | ? | unpublished | | L.P.S. |
| 2010 | *beat* | Sylvain Pohu (CAN) | sextet (1 sixxen) | 11’40” | unpublished | | Sixtrum |
| | *Communio: Pascha Nostrum Immolatus Est Christus* | Martin Grubingen (AUT) | choir and 1 sixxen | 5’21” | unpublished | | |
| | *Psappha, a personal take* | Enrico Bertelli (ITA) | solo | 14’ | unpublished | with midi drums and tape (sampled sixxen) | |
| | *Venus* («*Morning star*») | Rozalie Hirs (NLD) | Sixxen and tape | 9’33” | Donemus | Sixxen required in one movement («*Morning star*») and tape | S.D.H. |
| | *X-trum* | Fabrice Marandola (FRA) | quartet (4 sixxens) | 6’ | unpublished | | Sixtrum |
| 2011 | *Obsolve* | Sam Britton–alias Isambard Khroustaliov (GBR) | solo (multi percussion) | 6’51” | unpublished | | London Sinfonietta |
| | *Talea (2nd version)* | François Sarhan (FRA) | quartet (1 sixxen) | 7’35” | unpublished | | Drumming |
| 2011-2012 | *Étoile* | Friedrich Cerha (AUT) | sextet (2 sixxens) | 23’ | Universal Edition | | P.P. |
| | *S(c)enario* | Flo Menezes (BRA) | sextet (3 sixxens) | 23’ | unpublished | | L.P.S. |
| 2012 | *De l’itération* | Philippe Leroux (FRA) | sextet (2 sixxens) | 20’ | Gérard Billaudot | | Sixtrum |
| | *Digression* | Nicolas Tzortzis (GRC) | sextet (2 sixxens) | 8’ | Babel Scores | | Sixtrum |
| | *Intermetallic* | Amanda Cole (AUT) | quartet (4 sixxens) | 14’35” | Australian Music Center | with live electronics | Synergy |
| | *1, 3, 6, 10…* | Giovanni Damiani (ITA) | solo (1 sixxen) | 30’ | unpublished | | |
| 2013 | *Adelaide* | Kristina Warren (USA) | quartet (3 sixxens) | 5’ | unpublished | work for 3 sixxens and piano | C.I.M. |
| | *Beauty will be amnesiac or will not be at all* | Anthony Pateras (AUS) | sextet (Sixxen) | 60’ | Australian Music Center | with tape and live electronics | Synergy |
| | *Etched in sand* | Nina C. Young (USA) | sextet (2 sixxens) | 9’ | unpublished | | Sixtrum |

***Appendix 4***. Cont.

| Year | Title | Composer (Country) | Instrumentation | Length | Edition | Observation | Commission by |
|---|---|---|---|---|---|---|---|
| (2013 cont.) | *Lachez tout! / Enough already* | François Sarhan (FRA) | chamber ensemble (1 sixxen) | 70” | unpublished | | Red Note Ensemble |
| | *Le rêve d’Ahmed* | Serge Provost (CAN) | sextet (2 sixxens) | ? | unpublished | with live electronics | Sixtrum |
| | *Valle-Einstein (omaggio ad Albert Einstein)* | Giovanni Damiani (ITA) | trio (1 sixxen) | variable | unpublished | | |
| 2014 | *An exploration of bright* | Marc Yeats (USA) | chamber ensemble (1 sixxen) | 18’ | unpublished | | Chamber Cartel |
| | *Four meditations on the stars* | Cassiopeia Sturm (USA) | duo with electronics (1 sixxen) | 10’21” | unpublished | with live electronics | |
| | *Intonarumori* | Devon Yasamune Toyotomi (USA) | Sixxen | ? | Green Giraffe Music | | |
| | *Mechanical ghosts* | Anthony Donofrio (USA) | sextet (3 sixxens) | 17” | unpublished | | C.I.M. |
| | *Microtonal Christmas - Carol of the Sixxen* | Clocks in Motion (USA) | quartet | 6’ | not based on notation | | C.I.M. |
| | *Night* | Ben Davis (USA) | sextet (3 sixxens) | 10’ | unpublished | | C.I.M. |
| | *No. 56 Scala II* | Peter Adriaansz (USA) | septet (1 sixxen) | 25’ | unpublished | | S.D.H. |
| 2015 | *After the Zooids* | Melody Eötvös (AUS) | quartet (2 sixxens) | 1’30” | unpublished | | Synergy |
| | *Day* | Ben Davis (USA) | septet (2 sixxens) | 31’ | unpublished | | C.I.M. |
| 2016 | *A strange manuscript found in a copper cylinder* | Melody Eötvös (AUS) | choir and percussion quartet (4 sixxens) | 20’ | Eötvös Publishing | SSAATB Choir | Synergy VOX |
| | *Cinemusica - Two Movements for Percussion & Strings* | Timothy Constable (NLD) | chamber orchestra (1 sixxen) | 10’ | unpublished | | Synergy |
| | *Breaking the news* | Isaac Pyaat (USA) | solo (multi percussion) | 7’20” | Apaka Music | | |
| | *Estudo para Sixxen* | Estércio Marques (BRA) | Sixxen | 6’ | unpublished | | Impact(o) |
| | *Música para Trompa e Sixxen* | Estércio Marques (BRA) | Sixxen and horn | 10’20” | unpublished | | Impact(o) |
| | *Time in transcendence* | Joseph Koykkar (USA) | quartet (1 sixxen) | 12’20” | unpublished | | C.I.M. |

***Appendix 4***. Cont.

| Year | Title | Composer (Country) | Instrumentation | Length | Edition | Observation | Commission by |
|---|---|---|---|---|---|---|---|
| 2017 | *After Spring* | Michelle Agnes (BRA) | Sixxen and orchestra | 15'20" | unpublished | Concerto for Sixxen and orquestra | Impact(o) |
| | *Intra (Intermetamorphosis)* | Mark Fell (GBR) | quartet (4 sixxens) | 35'55" | unpublished | | Drumming |
| | *Sededinrondos* | Carlos dos Santos (BRA) | Sixxen | ? | unpublished | | Impact(o) |
| | *Metal music* | Garth Paine (AUS) & Simone Mancuso (ITA) | duo with electronics (1 sixxen) | 9'40" | unpublished | | |
| | *Quartered* | Ryan Lott (USA) | quartet (4 sixxens) | 25' | unpublished | for live ensemble or for playback as a 4-way sound installation | Third Coast |
| | *Sky, Let the Rain Fall* | Sandy Evans (AUS) | chamber ensemble (2 sixxens) | 10' | unpublished | | Taikoz |
| | *Whiplash* | Stéphane Magnin (FRA) | sextet (Sixxen) | 33' | Le Chant du Monde | open instrumentation that could include the Sixxen | L.P.S. |
| 2018 | *Dance of the Sixxen – Plum Fairy* | Daniel Morphy (USA)–Arr. | quartet (4 sixxens) | 2'40" | unpublished | arrangement for 4 sixxen based on *Nutcracker* | TorQ |
| | *Dans les pas de la main* | Augustin Braud (FRA) | solo percussion and ensemble (1 sixxen) | 13'36" | unpublished | | Chamber Cartel |
| | *Frame* | Domenico Melchiorre (CHE) | trio (1 sixxen) | 11' | Verlag Neue Musik | | DeciBells |
| | *On the Passage of a Few Ants Through a Rather Brief Unity of Time* | Nicola Deane (GBR) | based on previous recordings | 13'32" | not based on notation | short film with samples from «*Métaux*» treated and incorporated to the multilayered soundtrack, an audio-visual media for a conceptual art installation | |
| | *Protomusic* | Mark Fell (GBR) | large ensemble (4 sixxens) | variable | not based on notation | instruments recorded and presented in a sound installation | |
| 2019 | *Incircles* | Domenico Melchiorre (CHE) | sextet (Sixxen) | 25' | unpublished | | DeciBells |
| | *Frammenti* | Domenico Melchiorre (CHE) | quartet (1 sixxen) | 25' | Verlag Neue Musik | | DeciBells |
| | *Niyama* | Domenico Melchiorre (CHE) | percussion quartet and orchestra (1 sixxen) | 17'56" | unpublished | | DeciBells |
| | *Black Dino* | Bendik Hovik Kjeldsberg–alias Bendik HK (NOR) | keyboard ensemble (1 sixxen) | 7'34" | not based on notation | sixxen used as a source of the sampled sound | |

***Appendix 4***. Cont.

| Year | Title | Composer (Country) | Instrumentation | Length | Edition | Observation | Commission by |
|---|---|---|---|---|---|---|---|
| (2019 cont.) | *Dark Green 51* | Bendik Hovik Kjeldsberg–alias Bendik HK (NOR) | keyboard ensemble (1 sixxen) | 5'40" | not based on notation | sixxen used as a source of the sampled sounds | |
| | *Glacier Blue Skylark* | Bendik Hovik Kjeldsberg–alias Bendik HK (NOR) | keyboard ensemble (1 sixxen) | 5'52" | not based on notation | sixxen used as a source of the sampled sounds | |
| | *Grey E Master* | Bendik Hovik Kjeldsberg–alias Bendik HK (NOR) | keyboard ensemble (1 sixxen) | 5' | not based on notation | sixxen used as a source of a sampled sounds | |
| 2019-2020 | *Epicentre: Seismic Construction in 3 Parts* | Johannes Maria Staud (AUT) | trio (3 sixxens) | 16' | Breitkopf & Härtel | piece commissioned by Kölner Philharmonie, Wiener Konzerthaus and Martin Grubinger | P.P. |
| 2020 | *Sphaira* | Domenico Melchiorre (CHE) | septet (1 sixxen) | 6' | Verlag Neue Musik | piece for sound sculpture and percussion sextet | DeciBells |
| | *@HOME - 1 - Contact* | Les Percussions de Strasbourg (FRA) | sextet (1 sixxen) | 4' | unpublished | collectif video composition, sixxen treated with electronics | L.P.S. |
| | *Sora* | Gérard Langella–alias Mr Untel (FRA) | keyboard ensemble (1 sixxen) | 4'42" | not based on notation | sixxen used as a source of a sampled sounds (samplers and synthesizers ensemble) | |
| | *Kaiyō* | Gérard Langella–alias Mr Untel (FRA) | keyboard ensemble (1 sixxen) | 4'58" | not based on notation | sixxen used as a source of a sampled sounds (samplers and synthesizers ensemble) | |
| 2019-2021 | *Theta Carinae* | Bertrand Gourdy (FRA) | sextet (Sixxen and gamelan) | 16' | unpublished | | R.G.M. |
| 2021 | *Samsa* | Domenico Melchiorre (CHE) | flute, bass desmophone and percussion quartet (1 sixxen) | 20' | Verlag Neue Musik | | DeciBells |
| | *Chiffren* | Domenico Melchiorre (CHE) | octet (1 sixxen) | 28' | unpublished | | |
| | *Seven* | Anna Sowa (POL) | Sixxen and tape | 5' | unpublished | work with tape | R.G.M. |
| | *theôrìa α* | Charles David Wajnberg (FRA) | sextet (Sixxen and multipercussion) | 20'30" | unpublished | | R.G.M. |
| | *Σχίζειν–Schizein* | Daphné Héjébri (FRA) | Sixxen | 7'20" | unpublished | | R.G.M. |
| | *Um* | Gitbi Kwon (KOR) | sextet (Sixxen and multipercussion) | 11'40" | unpublished | work with transducers | R.G.M. |

***Appendix 4***. Cont.

| Year | Title | Composer (Country) | Instrumentation | Length | Edition | Observation | Commission by |
|---|---|---|---|---|---|---|---|
| (2021 cont.) | *Path* | Michelle Agnes Magalhães (BRA) | sextet (4 sixxens and gamelan instruments) | 8’ | unpublished | | R.G.M. |
| | *Country & Gamelan #5* | Thomas Meadowcroft (AUS) | nonet (Sixxen, gamelan instruments, multipercussion, ukulele and tape) | variable | unpublished | work with tape | R.G.M. |
| | *Slow, Text, Fast* | Zacarias Maia (BRA) | quartet (4 bars of Sixxen) | 7’20” | unpublished | music theater actions are required | R.G.M. |
| | *One direction* | Zacarias Maia (BRA) | quartet (4 bars of Sixxen) | 2’40” | unpublished | | R.G.M. |
| 2022 | *Aisling* | Domenico Melchiorre (CHE) | Saxophone and percussion quintet (1 sixxen) | 20’ | unpublished | saxophone (alto and soprano), vibraphone, gaiabells, two percussionists and bassdesmophone | DeciBells |
| | *Jeux d’ondes pour six sixxens* | David Chalmin (FRA) | Sixxen | ? | unpublished | | Trio Xenakis |
| | *“Nouvelle œuvre pour Sixxen”* | collectif (CHE) | ? | ? | ? | piece created on December 2022 | Contrechamps |

**Legend:**

**Countries**

ARG – Argentina
AUS – Australia
AUT – Austria
BRA – Brazil
CAN – Canada
CHE – Switzerland
CHL – Chile
COL – Colombia
DEU – Germany
FRA – France
GBR – United Kingdom
GRC – Greece
ITA – Italy
KOR – South Korea
NLD – Netherlands
NOR – Normay
POL – Poland
PRT – Portugal
USA – United States

**Complementary information**

? – Information not founded

**Ensembles**

C.I.M. – Clocks in Motion
K.E. – Klank Ensemble
L.P.S. – Les Percussions de Strasbourg
N.E. – Nova Ensemble
P.P. – Percussive Planet
R.F.B.F. – Red Fish Blue Fish
R.G.M. – author’s present artistic research
S.D.H. – Slagwerk Den Haag