Meta-Xenakis

New Perspectives on Iannis Xenakis's Life, Work, and Legacies

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Cover image: Iannis Xenakis at the C.R. MacIntosh Museum, Glasgow, Scotland, 1987. Photo by Henning Lohner, courtesy of CIX Archives, Lohner collection.

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30. The UPIC System of Iannis Xenakis: Autoethnography as *Rapprochement*

Peter Nelson[1]

The UPIC (Unité Polyagogique Informatique de CEMAMu) system, conceived by Iannis Xenakis in the 1960s and 1970s, and realized with a team of collaborators at CEMAMu (Centre d'Etudes de Mathématique et Automatique Musicales) in Paris during the latter half of the 1970s, was a device for the creation of music consisting of a large, digitized drawing board connected to a purpose-built minicomputer (see Figure 30.1).[2] It brought together two aspects of Xenakis's life, the architecture studio with its distributed design process, and the radiophonic studio—with Pierre Schaeffer's (1910–95) Groupe de Recherches Musicales (GRM) as a model—and its concern for the direct creation of sonic materials by technical means, using the new technology of the digital computer.[3] Xenakis had asked Schaeffer to create a computer facility at GRM, but Schaeffer had refused.[4] The UPIC put the physical act of drawing, and the spatial and graphical paradigms of design at the heart of the act of composition, providing direct access to the sonic consequences of the design process. By 1987, the system was stable and had developed from its initial prototypes, with their lengthy computation times for the generation of sound from the graphic input, to have real-time capabilities. A number of production models of the UPIC were available in studios internationally, as well as in the Paris studio of the organization Les Ateliers UPIC, of

1 I am most gratefully indebted to Anthony Gritten, who read and commented on an earlier draft of this article.

2 CEMAMu (Center for Studies in Mathematics and the Automation of Music), was founded in 1965 at CNET (Centre de Recherche et Développement de France Télécom (Center for Research and Development of France Telecom)), Issy-les-Moulineaux, France, with grants from the French Ministry of Culture. For a broad overview of the UPIC, see Weibel et al., 2020. For a discussion of the meaning of "Unité Polyagogique Informatique" see below.

3 The Groupe de Recherche de Musique Concrète (Research Group for "Concrete" Music) (later GRM) was founded by Schaeffer in 1951. For a discussion of "concrete music" see Schaeffer, 2012. Xenakis became a member of the group in 1954 and created his first five electronic works there: *Diamorphoses* (1957), *Concret PH* (1958), *Analogique B* (1959), *Orient-Occident* (1960), *Bohor* (1962), representing one-third of his electroacoustic output.

4 Asserted in a public interview between Xenakis and Richard Steinitz, Huddersfield Contemporary Music Festival, 1987. (Recording in the author's personal archive.)

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which I was an associate from the presentation of the UPIC computer music system at the Huddersfield Festival of Contemporary Music in 1987, until its presence at the Radio France concert celebrating Xenakis's seventieth birthday in 1992.[5] Les Ateliers UPIC was an educational organization, based around the UPIC technology, and situated first at the Parc de la Villette in Paris, and later at Massy in the Paris suburbs, in a building shared with the performing ensemble L'Itineraire. As an associate, I presented the UPIC system at public events, in Paris and internationally, mentored composers working with the system, took part in workshops for young people and for student composers, and wrote a number of works myself on the UPIC.[6] Xenakis himself was only peripherally involved in the work of the atelier, but we met first in Paris in the summer of 1987, when he demonstrated the UPIC to me at CEMAMu, and later that year at the Huddersfield Festival where he was a featured composer. It was due to his impression of me during the workshops at Huddersfield that I was invited to become an associate of the atelier. Subsequently, our paths crossed from time to time, always with a friendly directness that led us to discussions of ideas and practicalities without much social padding. He was interested in discussing ways in which the UPIC might be improved and developed, both technically and conceptually, so it was, for him, neither a finished "product" nor a cherished and guarded project, but rather an ongoing investigation, deeply wedded to his ideas about education and the needs of young people as well as to the development of the computer as an aid to music composition. It was also a practical tool, and not intended as the foundation for any sort of cultural institution. In this respect, the CEMAMu and Les Ateliers UPIC were very different from IRCAM (Institut de Recherche et Coordination Acoustique/Musique), with which they competed for both prestige and funding.[7]

I have called this chapter an "autoethnography," but I do not want simply to reminisce. Autoethnography is an attempt to fuse personal narrative and sociocultural exploration. While one of its aims is to legitimize every-day, personal, subjective experience and the "insider" view, as a counter to notions of objectivity and theoretical abstraction, the participant observer still has to make sense of what they experience, and that involves a direct encounter between those experiences and whatever framing narratives can be found to make sense of them. Unlike the work of Georgina Born, this is not an attempt to establish any sort of foundation for the study of the sociocultural formations of music. Nor is it an attempt to argue for one institution—CEMAMu—over another—IRCAM—though their activities through the 1980s ran in parallel and provide some interesting contrasts. All the same, I do take some cues from Born, particularly the notion that cultural forms and institutions operate "through many

5 For a brief history and discussion of Les Ateliers UPIC, see Després, 2020.

6 *Tournoiments de Spectres* (1988), *Alliages/Rituels* (1990) for real-time UPIC performance, with Pierre Bernard and Alain Dépres, *Ichthys* (1992) for UPIC and ensemble.

7 For a discussion and critique of the cultural formation of IRCAM, see Born, 1995.

simultaneous, juxtaposed, and interrelating forms or mediations."[8] I will start by considering some of the framing narratives that I have found useful and identifying some of the terms that support these narratives. However, in thinking about my own experience, I want to focus on the multi-facetedness and interdisciplinarity that grounded Xenakis's whole creative output, and to consider how this is reflected in the UPIC and in the experiences of those who worked with it.

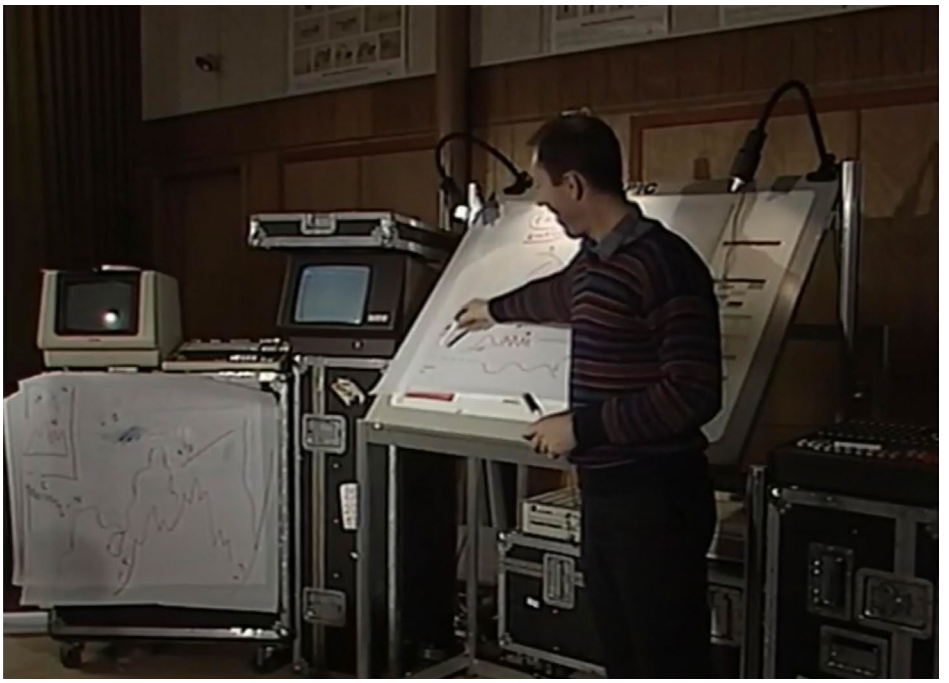

Fig. 30.1 The author demonstrating the UPIC system in Quebec, 4 February 1989. Still from video, Archives: composer de la musique par le dessin à l'aide de l'UPIC, Radio-Canada, https://ici.radio-canada.ca/info/videos/media-7644182/archives-composer-de-la-musique-par-le-dessin-a-laide-de-lupic, 1'56".[9]

The framing narratives against which I want to measure my own experiences follow cues from three rather separate conceptual sources. First, the UPIC, as a conglomeration of technical devices, and material and social processes, seems to me to fall under the category of an *apparatus*, described by Giorgio Agamben (b. 1942) as "a heterogeneous set that includes virtually anything. [...] The apparatus itself is the network that is established between these elements," and we will come in a moment to consider what these "elements" might be.[10]

8 Born, 1995, p. 17.

9 Unité Polyagogique Informatique du CEMAMu translates as the Computerised Polyagogic Compendium of the CEMAMu; cf. Varga, 1996, p. 121, and "UPIC—Presentation", *Centre Iannis Xenakis*, https://www.centre-iannis-xenakis.org/cix_upic_presentation?lang=en; Agostino Di Scipio, "UPIC" (2023), *Les Amis de Xenakis*, https://www.iannis-xenakis.org/en/dictionary-upic/

10 Agamben, 2009, p. 2–3.

This mention of the theme of the network raises, as the second conceptual source, recent work that draws music into the orbit of science and technology studies, located around the writing of Antoine Hennion and Bruno Latour (1947–2022), which try to map and take account of *all* the components of a situation and their inter-relations, regardless of the type of those components.[11] More specifically, this approach reorientates the discussion away from key persons, objectified works, and specified devices in order to consider the processes, assemblages of actors and materials, and the power differentials that form and motivate the living presences of people, communities, and technical means.

Thirdly, the interdisciplinarity that seems to me to be foundational for Xenakis resonates with the notion of the engineer, a figure defined by a messy combination of the theoretical and the practical. It is no coincidence that Engineering was the focus of Xenakis's studies at the Athens Polytechnic. In his book on Galileo (1564–1642) as engineer, Matteo Valleriani identifies two epistemological foundations for his investigation, that might be useful in the current discussion. The first is the notion of *mental models*, that is: "knowledge representation structures based on default logic, which allow inferences to be drawn from prior experiences about complex objects and processes even when only incomplete information on them is available."[12] This fits with the fundamental processes of the UPIC, which prioritize immediacy and physical gesture over precise calculation, and the instincts of drawing and spatial design over knowledge about aspects of sound. The second is the notion of *challenging objects*. Valleriani defines these as: "historically specific material objects, processes or practices entering the range of application of a system of knowledge without the system being capable of providing a canonical explanation for them."[13]

I am going to propose *music*, in the context of this discussion, as constituting one such "challenging object," and to suggest that the "mental models" around music exist as an overlay of theory-based calculation and experientially mediated "rules of thumb" that represent embodied, social, material, and performative—that is "action-based"—types of knowledge in entirely informal and ad hoc ways. This goes against the production of "universalizing explanations of music" that "read these properties as imminent in music."[14]

What I want to do in this chapter is to consider my experience of the UPIC from this set of perspectives. First, I will think through some of the components of the network constituted by the UPIC, to get a sense of what needs to be considered. Then I will try to flesh out these components, using my own experience of them, while also using the conceptual frames just outlined to make sense of my experience. Finally, I will try to think about the implications of this whole discussion for the continued presence and relevance of the UPIC as a viable musical apparatus.

11 See for example Hennion, 2015; Latour, 2005.
12 Valleriani, 2010, p. xii.
13 Ibid.
14 Born, 1995, p. 20.

The Network of the UPIC

The network of the UPIC, to be true to Agamben's "heterogeneous set," should include concepts and practices, as well as social instantiations, locations, and sets of values, and probably whatever else results from the interactions of the participant with the network. During my own association with the UPIC, I gathered a very partial view of what the components of the network might be, and how they operated, and in a sense my account of these gives as much insight into my own concerns as a working musician as it does into the UPIC as a technology in its own right. But it is the purpose of autoethnography to explore relations and interactions, and to eschew notions of objectivity and explanation.

My first encounter with the UPIC was at the CEMAMu, in the summer of 1987, where Xenakis himself supervised a couple of days of initiation before the presentations at the Huddersfield Festival later in the year. It was clear from the start that the extreme openness, of being able to draw freely on a blank page, favored an unstable notion of pitch: it is easy to draw a curve or diagonal, difficult to draw a horizontal line without perturbation (unless you use a ruler!). In their history of the UPIC,[15] Gérard Marino, Marie-Hélène Serra, and Jean-Michel Raczinski, three of the technical collaborators on the design and construction of the UPIC system, note that early discussions of the UPIC concept centered on the graphic materials for Xenakis's early orchestral work *Metastasis*, in which the *glissando* is developed as a key sonic entity: an entity that was to remain central to Xenakis's musical thought. They write: "graphic representation has the advantage of giving a simple description of complex phenomena like *glissandi* or arbitrary curves. Furthermore, it frees the composer from traditional notation that is not general enough for representing a great variety of sound phenomena."[16]

Whether or not this is in fact true, it gives the graphic image, and the process of drawing—as a sort of direct access to the imagination—the status of an initial insight. As Xenakis wrote,

> The computer should not only be used for sound synthesis, but also for [...] large-scale construction. [...] The obstacle lay in the computer field: how do you pass on to the machine the notation and concepts that musicians learn in conservatoires? The solution was the hand: for the musician to give orders to the computer using drawings, not punched cards or programmes.[17]

This insight rests on an acknowledgment of the ways in which graphic practice grasps complexity, as a sort of *mental model* that allows an ad hoc manipulation of processes

15 Marino et al., 1993.

16 Ibid., p. 260.

17 Xenakis, 1979, p. 9 (author's translation) [*Il ne faut pas se servir de l'ordinateur uniquement pour la synthèse des sons, mais également pour* [...] *les constructions à grande échelle.* [...] *L'obstacle se situait du côté de l'informatique : comment transmettre à la machine une notation et des concepts que le musicien apprend dans les conservatoires ? La solution, c'était la main : que le musicien donne ses ordres à l'ordinateur par l'intermédiaire de dessins, et non de cartes perforées ou de programmes*].

and phenomena that are otherwise difficult to calculate. It became the key feature of all of my own public presentations of the UPIC system, in which drawing, without thinking about the process as a sort of "music notation," became a means of access for people of all ages and backgrounds, regardless of their musical, or even their drawing capabilities. Graphism is not necessarily pictorial so much as it is diagrammatic, where the critical thing is the clear representation of an idea rather than the production of a beautiful image.[18] Thus, the development of a technique of using the UPIC rested on a dialogue between sound phenomena and graphic phenomena.

However, the graphic and sonic entities of which the *glissando*, with its sonic continuities, is the default type present certain performance difficulties on traditional instruments, thus: "In addition, if such a system could play the score by itself, the obstacle of finding a conductor and performers who want to play unusual and 'avant-garde' music would be avoided."[19] This, entirely cultural and political critique, remains a part of the UPIC's inheritance, despite Xenakis's development of the *glissando* as a fundamental musical material in numerous solo, ensemble, and orchestral works for conventional instruments. The performance element of the system, as a sort of rapid prototyping environment for the process of composition, proposes the UPIC as a DIY solution for unconventional sonic strategies, bypassing the social difficulties presented by human performers. While this might also be true of the resources of the electronic studio as a category, the explicit inclusion of "performance" into the ambit of the UPIC had consequences for some of the works written on it, and colored the relationship between sound and image.[20] Thus, for the performances of *Mycènes Alpha* (1978) presented by Les Ateliers UPIC, slides of the UPIC pages would be shown in synchronization, not as a sort of cheesy Mickey Mousing, but because the strange aesthetic of the graphic images complements and contextualizes the sonic result. Finally, the notion of machine performance is radically opened up by the suggestion by Marino, Serra, and Raczinski that: "the system should not impose predefined sounds, predefined compositional process, predefined structures, and so on. It is essential for the creative mind that ideas not go through theories or limitations that might not suit the composer."[21] This echoes Xenakis's own view when he writes: "In musical composition, construction must stem from originality which can be defined in extreme (perhaps inhuman) cases as the creation of new rules or laws, as far as that is possible; as far as possible meaning original, not yet known or even foreseeable."[22]

This presents a moment of what James Mooney and Trevor Pinch call the "sonic imaginary." "In a sonic imaginary," they write, "sound itself has a sociomaterial agency and makes a crucial difference in how worlds are enacted. [...] we treat the

18 Cf. Tufte, 1991.
19 Marino et al., 1993, p. 260.
20 For example, Xenakis's *Taurhiphanie* (1987), performed live at the arena in Arles, 13 July 1987. Cf. Nelson, 2010.
21 Marino et al., 1993, p. 260.
22 Xenakis, 1992, p. 258.

imaginary as an emergent phenomenon from the material world."[23] The "material world" here includes not just the technical device of something like the UPIC but also the conceptual, social, and actively embodied practices that make up the *apparatus*. Mooney and Pinch conceive of this as "a way of imagining and bringing forth a shared sonic world or experience grounded in technology, institutions, and networks."[24] This way of thinking binds the *challenging object* of music to its material and social situation, rather than to some specific, internally registered and imagined sensory experience. In categorizing sound as "an emergent phenomenon," Mooney and Pinch are also suggesting that it may not "come first," as we shall see in a moment. The emergence of the sonic imaginary says something not just about the circumstances from which it emerges, but also about the circumstances into which it appears. One could almost imagine it as a process of divination, in which the invocation of sound—its calling into being through, in this case, the graphic techniques of the UPIC—is an address to something deeper than sound that calls it to action through sound. Xenakis's concern for the fundamentals of nature, and the forces that reside there, includes a desire to let those forces speak; to set up the circumstances within which "worlds are enacted."

Since the sonic imaginary figures as a set of material and social premises, what might these consist of in the case of the UPIC? First, the size and the technical specificity of the system required a studio setting, with all its gate-keeping and administrative support. In the case of Les Ateliers, this consisted only of one audio technician and a studio director, with a constantly changing group of associates such as myself, available on a temporary basis for specific projects. Thus, the UPIC studio did not have the sort of institutionalized technical expertise enshrined in the iconic radiophonic studios of the twentieth century, so clearly documented by scholars like Tatjana Böhme-Mehner and Jennifer Iverson, where the studio technicians themselves provided a significant part of the actual material of their "sonic imaginaries."[25] The concept of the diagonal or *glissando*, noted above, speaks to the graphic representation at the heart of the UPIC's conception, which resulted in a graphic approach to sound, without "pre-sets" or indeed any of the other techno-specific sonic strategies such as filtering, speed transposition, echo and reverberation, etc. The radically open possibilities of the graphic environment meant that there was really no "hidden knowledge" available through technical expertise. The graphism evident in the studio, however, did focus on certain strategies: the diagonal is one, and its development into arborescence was another. This graphic approach extended to notions of musical structure, which was thus predicated on concepts of spatial design, rather than on the cinematic concerns of *musique concrète*, or the serial and systemic concerns of classical electronic music, both of which have *transformation* at their core. Lastly, as will be discussed below, the sonic imaginary included a sort of openness, even roughness that was not present in

23 Mooney and Pinch, 2021, p. 114.
24 Ibid.
25 Böhme-Mehner, 2011; Iverson, 2019.

the hi-fi, emulative aesthetics of conventional studios. The "challenge" of the object of music, created on the UPIC, extended through material and structure to the quality of the sound itself.

The heterogeneity of the list of features above that evoke the sonic imaginary of the UPIC testify to a certain uncertainty about the purpose of the UPIC. The technical synthesis of sound, for instance, does not appear as a key feature, and the notion of rapid prototyping is related to a much more general concern for "complex phenomena." This uncertainty of purpose was reflected in my own experience of attempting to explain the workings of the system to other composers, yet this multiplicity, evident also in the description of the system by Marino et al., in fact prompts the system's name: the first two letters U and P stand for Unité Polyagogique. Xenakis explains this phrase in one of his published interviews with Bálint András Varga (1941–2019):

> *Polyagogique* is my coinage: *agogie* means training or introduction into a field; *poly* means many. When designing we are working in space with our hands (geometry); in constructing rhythmic models we have to compute distances (geometry and arithmetic); also general forms. And finally there's the sound. All those things together [...] make *polyagogique*.[26]

This account of the UPIC's core conception seems to me to propose music—let's call it that—quite explicitly as the sort of challenging object outlined above: we know what music is in general, but there is no "canonical explanation" for it. Xenakis seems even to explode this object into multiple "fields": space, rhythm, sound, each with its own sort of epistemology—geometry, arithmetic etc.—that the UPIC seeks to combine into a unity. My attempt to generate complexity here is deliberate, since this apparatus, which seems to present as a simple means of drawing sounds, turned out to be a device of legendary intransigence in actual operation. As Dimitris Kamarotos remarks:

> One of the reasons why many surprising difficulties for the users remained after their first contact with the system was due to the influence of how the system was promoted: as an intuitive, non-technically inclined system encouraging creativity. People were promised they would be able to make music, or at least complex, interesting sound structures without any knowledge of computers, or even music.[27]

The Sound of the UPIC

When Xenakis speaks of *agogie* as "training or introduction I think he is not really describing the UPIC as a tool for education and learning in the obvious sense: learning to use the UPIC is an education in itself; an exploration of the challenging object that is music. The extreme openness of the technical apparatus of the UPIC makes it a fertile space for puzzlement as well as creative play, and in that sense, it is, in Agamben's

26 Varga, 1996, p. 121.
27 Kamarotos, 2020, p. 255.

terms, a sort of "profane" device. Agamben is concerned with the ways in which an apparatus is implicated in the very formation of the subject who encounters it, or, in the case of the contemporary technologies he so despises, the "de-subjectification" of the subject, where the practices, discourses, and bodies of knowledge that mark an apparatus—the mobile phone is Agamben's particular target here—induce a docile and disciplined abdication of identity. Agamben is interested in the notion of the profane because, "'to profane' signified [...] to restore the thing to the free use of men."[28] The openness of the UPIC—its blank space for drawing, unaided, with only the impetus and gestural potential of the human hand and eye—makes it a space for searching, not just for sound but also for the creative subject in relation to sound, and for the imagination of an original disposition of events in the world. For the individual creator, of course, this is both liberating and problematic. Some of the famous composers who came to create work in the studio left puzzled and clutching only materials that they intended to use later within their usual creative practice.

It seems to me emblematic of the conception of the UPIC that sound comes at the end: as Xenakis says (cited above), "And finally there's the sound." When Brigitte Condorcet (Robindoré) refers to the perception of the UPIC's sound as being "somewhat harsh," she is registering the frequent sense of disappointment of people using the device for the first time.[29] Because of the vagaries of drawing waveforms by hand, or even using wave elements extracted from pre-recorded samples, sound was not the specified outcome of a process of design, but rather the unspecified outcome of a process of searching that involved a drawing together of strands of existence: the existence of the atelier with its machinery and its *camaraderie*, the existence of the maker of the sounds as experienced in the process of creation, as much as the existence of the drawn arc, with its configuration of waveform, dynamic envelope, and other attributes. In all the workshops I was involved in, it was necessary to effect a sort of *rapprochement* between the users and the device: one had, in a sense, to develop a relationship to the UPIC's very individual openness in order to find out what it could give you. In this sense, the UPIC worked as a sort of socializing device for bringing people, domains, and disciplines into connection, rather than as an efficient compositional tool with its own set of sophisticated techniques and resources. In this sense it contradicted both the large—and small—system paradigms of music production using a computer. It set up the circumstances for action, within which sound and music were only a part of the enterprise. Thus, the UPIC does not figure as a Modern, labor-saving device of transparent access. This seems to me to fit with Xenakis's entirely un-modern approach, and in this context the sound of the UPIC perhaps fulfils only un-modern expectations. It was never the intention—as it was with other computer sound generation attempts like the MUSIC-X languages or the Moog synthesizer—to model instrumental or bio-physical sound production, or to

28 Agamben, 2009, p. 18
29 Condorcet, 2020, p. 403

implement black-box instantiations of generic compositional techniques. In particular, the human interface of the UPIC remained resolutely physical and optical, rather than intellectual.

"It Can Be Put in Everyone's Hands"[30]

The sense of a core concept of the UPIC, however it gets related by the key players in its formation, is clearly molded by the institutions within which the UPIC first emerged. It was Xenakis's intention to make the UPIC available, through individual access, workshops, and demonstrations to a wide and diverse group of users of all sorts: other composers and sound artists, young people and students, even the general public. When people encountered the UPIC for the first time—or even as regular users—they entered a studio environment with a particular set of objectives, practices, resources, and expectations. The UPIC itself was large and technically imposing; each device was unique and hand-built, requiring the sort of dedicated technical support only available within an institutional environment. Thus, although the interface was conceptually simple, it presented as a sort of secret knowledge since this device was unlike anything in even the conventional electronic studio: no piano keyboard; no patch-chords; no programming language: simply pointing and touching within a graphism containing multiple, virtual layers. But at the same time, there *were* no secrets. The *mental models* in use by participants in these workshops were, as Xenakis explained and conceived them, a drawing together of different representations of a common knowledge: on the one hand, an exploratory investigation, through drawing, of the gestures and images of human culture, and their sensory effects as pressure waves; on the other hand, an innate and individually mediated practice of temporal narrative where the metaphor of sound as space is dominant. In this sense, the UPIC figures as an interface which, as Ksenia Fedorova presents it, "enables the representation of 'objects' that do not have a phenomenal or material existence—such as imaginary and virtual objects, but also fantasies and desires."[31] This made it a powerful play-surface on which users could encounter the sonic consequences of their understandings of the cosmos—whether based in science and rationality, or in narrative and imagination. The encounter was always engaging because of the direct, hands-on experience which was potentially transformational. As Fedorova writes, "What in thermodynamics is 'work' and in a graphical user interface is a response to a software system, in the case of a human self is transformation of its position as a relational being."[32] These relations were sometimes specific. Xenakis, for example, was fond of saying that, since young people were short of stature with high voices, whereas adults were tall with low voices, there was a logic

30 Statement on the flyleaf of the promotional booklet, *L'UPIC du CEMAMu*, Paris 1987 [*Elle peut être mise entre toutes les mains*].
31 Fedorova, 2020, p. 16.
32 Ibid.

that suggested that sounds at the bottom of the UPIC table would be higher than those at the top.[33]

On the other hand, there were expectations represented by the various *social* factors in play-the fact that work in Les Ateliers was almost always in groups, with the practices of sharing and competition that groups evoke; the presence of a technician, that not only made technical problems evaporate but also provided a sense of theater in which the work was elevated to a sort of performance in itself, within the "stage" of Les Ateliers. The posters, photographs, and printouts on the walls of the studio—and the demonstrations that were an important part of the induction process—introduced particular sorts of drawing artefacts and sonic elements that became objects of either attraction or repulsion in the individual work of participants. In particular, the graphic elements of Xenakis's own *Mycènes Alpha* stood as an indissoluble part of the UPIC's apparatus: a piece that was always performed when Les Ateliers presented a concert of participants' works. This, despite the fact that each of the complete works that Xenakis made on the UPIC—*Mycènes Alpha*, *Taurhiphanie*, and *Voyage absolu des Unari vers Andromède* (1989)—develops a unique and radically different graphical approach.

Conclusion

What this brief discussion proposes is a decentering of our view of the UPIC as a tool that makes simple the musical possibilities of the *glissando*. The UPIC still has a fascination for us, but it is not quite the same as the fascination we have for other musical devices of the past, like the Moog synthesizer or the vinyl record. These devices seem to allow the reliving of an otherwise historical moment; a re-appropriation of a previously experienced sense of excitement and possibility, often enhanced by contemporary digital additions, that collapses the super-saturated *ennui* of an internet age in which everything seems to be instantly available, without effort. On the other hand, the UPIC seems like a device that is almost not yet accomplished: a glimpse of something still to be realized, where producing music does not necessarily get easier with practice. Les Ateliers did not figure, like IRCAM, as a quasi-scientific enterprise predicated on notions of progress and discovery. What the UPIC reveals is a concern not with the "future" of music, or with the past of music, but with the *possibility* of music as it arises out of the conjunction of living beings and the forces both within them and around them. This is a view of music whose sociocultural foundation implies a sociality that includes the cosmos, in an ancient Greek sense, though this can be seen mirrored in the contemporary views of, for example, Latour.[34]

I have written elsewhere[35] about my view of the UPIC as an apparatus for a sort of *sonic divination* mentioned above: an apparatus whose original voice mediates sound

33 Personal recollection but see also, for example, the interview previously cited (fn. 4).
34 Latour, 2005.
35 Nelson, 2024, forthcoming.

from beyond the known world; a method of tapping into—to follow for a moment the notion of the hyperobject explored by Timothy Morton—forces and energies that we cannot otherwise know.[36] For me, UPIC remains, as Xenakis explicitly envisaged, a polymorphous conception: not so much a device for composing, as a sort of graphic search engine, allowing us—through the drawing action of the hand—to rake through the infinite terrain of sound to see what is still there to be heard.

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Plate 9 Iannis Xenakis on his last day of teaching at the Université de Paris Paris I-Sorbonne, 1988.
Photo by Henning Lohner, courtesy of CIX Archives, Lohner collection.