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Xenakis (with Mrs. Xenakis in the background)-"a style that expresses the violence of his memories...."

# IANNIS XENAKIS: FORMULA FOR NEW MUSIC

### By JAN MAGUIRE

**P** THE ROAD through the street market of the hilly rue des Martyrs toward Montmartre, where hunched-over septuagenarian widows shop on the old-age pension of 60 cents a day, bellicose middle-aged housewives haul string bags loaded with potatoes and leeks, and laughing, fighting youngsters spill across the steep, narrow, cobblestoned street, we picked our finicky way to Xenakis's studio. Iannis Xenakis, whose name makes people start-either in rage or in intrigue-expects a complete overhaul of the format in which music has laced itself up for the past thousand years and which suddenly has become too small.

Xenakis is a Greek, born of a wealthy business family in Rumania, who fought in the Greek Resistance during the war, while he was attending the Athens Institute of Technology. After having been in and out of jail several times (as he points out, it was the Resistance that lost in Greece) and after having had the left side of his face flattened out in combat, he was banned from his country and now lives in Paris, where he has taken out French citizenship. In France he has studied music with Arthur Honegger and Olivier Messiaen, and he has worked in the architectural bureau of Le Corbusier to earn his living. He continues writing mathematical and architectural essays, while composing music and carrying on musical-mathematical research that already has altered the course of the future of music.

Xenakis was not in his studio when we arrived, so we went two blocks down the street to his home. We were greeted by Mrs. Xenakis, a modern young woman in slacks, whose short, dark hair, cropped close around her face, and dark-rimmed glasses gave the impression of a person of determination-but whose soft and natural graciousness, somehow, was not surprising for the wife of a musical iconoclast whose methods are kind and systematic. She explained that her husband had been with the technicians of the French Pavilion at the Montreal Expo 67 all day and was late returning. Cat-like, she cuddled up in an armchair and explained in monosyllabic simplicity, "The French Pavilion has a hole in the middle. They asked him to fill it up. With lights, light flashes every hour for eight minutes, with music." She spoke in detached phrases, absorbed in her thought. "He works night

#### SR/June 24, 1967

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and day. Leaves here at 9 in the morning, comes back for a quarter of an hour to have lunch with his daughter at 12:45, again at night from 8 to 9; then he goes back to his studio until 1 or 2 in the morning. He stands up all the time. There are no chairs there. Only tables, with long sheets of paper on them, and pencils. That's all. Killing. For months he's been working on this thing." A lovely ten-year-old with flowing, waist-length hair came in. We remarked that she was well on the way to young womanhood, a remark which Mrs. Xenakis affirmed with a nod of her head and with a twinkle in her eve. The young lady shook hands politely, then went to listen to Stravinsky on the radio.

"He doesn't eat, Xenakis," continued Mrs. Xenakis. "A glass of water for breakfast, a slice of ham for lunch, a spoon of soup for dinner. Sometimes he goes pale, but he won't admit it's from hunger. I put bananas around his studio. At night sometimes, when it is 2 in the morning and he still is not home, I wake up in a cold sweat and rush out of the house over to the studio. I imagine him lying unconscious on the floor. He laughs. He thinks I'm funny." Mrs. Xenakis, who was a member of the French Resistance during the war, received the highest decorations for heroism when she saved several lives when she was only thirteen years old. She doesn't like to talk about herself, but when pressed she bashfully admits, "Me, I'm a writer. I write novels."

Xenakis entered - a lean, handsome man of forty-four whose gentle, unassuming presence dominates the roomand apologized politely for being late. "Do you mind if I take off my jacket? My tie?" he asked. After explaining that his afternoon's thorny task had been to request \$84,000 for the material with which he would fill up the French Pavilion's central tunnel for Expo 67, he talked briefly about his new research group called the Group of Mathematical and Automatic Music, formed of professors of mathematics, psychology, esthetics, and representatives of IBM and the anthropological museum. They intend, over the next year or so, he explained, to fathom the fundamental structures of music, such as order. A sound can be ordered in the same way a peach can, in terms of high, medium, low; one, two, three; or as one in the middle, one on the left, and one on the right. All musical properties will be examined in the same way. The Group will then transpose its discoveries into sound by means of electronic equipment.

Xenakis's music comes from the anguish of his early, motherless years, from the sounds of the war and the street uprisings in Athens when, with a copy of Plato's *Republic* in his hands, he would hear from his prison window screams, shouts, gunfire, blasts, the raging mob, and crumbling buildings, then a long, deep, strange silence. At that time he thought that this must be put into music somehow, and he has now evolved a style of composition that expresses the violence of his memories—the shock and the dreadful calm pocketed with tiny sounds, and the mass, bulbous sound cataclysms he remembers.

Xenakis thinks of music in vast terms, as masses evolving, erupting, succeeding one another, or vanishing. His elements are clouds of sound-like clouds of smoke -made up of an indefinite number of particles. He uses the *glissando* extensively, as it is the most fluid succession of notes in Western music. For him it is not musical filigree but an essential musical expression. Even the clarinet is used fluidly, not in tones or even in half or quarter tones, but moving in constantly fluctuating pitches, like waves.

To control his clouds of sound, Xenakis applies the theory of probabilities, the only theory capable of dealing with great numbers. His first piece in this idiom, *Metastasis* (a Greek word meaning "after the fact"), was composed with Maxwell Boltzmann's theory of gas. He designed the Philips Pavilion at the Brussels World's Fair of 1958 on the sketches of *Metastasis*; Le Corbusier called it music in space. *Achorripsis* (meaning "jet of sound") was written with Poisson's Law of Probabilities:  $P_k = \frac{\lambda k}{K} e^{-\lambda}$  where  $\lambda$  is the average density of molecules or



particles and K is the frequency. To determine velocity he applies the Gauss Law. To define the probability that one section lying within another-a-should lie within its segment-j+dj- he uses the formula:

$$e(j) dj = \frac{2}{a} (1 - \frac{1}{a}) dj.$$

He transcribes theory into practicable ciphers by computer, but his music is normally written for the standard musical instruments. As Plato had insisted upon the principle of causality, Xenakis extends the principle by the laws of great numbers. "The explanation of the world and consequently of the sound phenomenon that surrounds us, or that may be created, required an enlargement of the causal principle, the basis of which is formed by the law of great numbers," he writes at the beginning of his book, Musiques Formelles (published by Richard Masse, Paris). This law implies an evolution toward a stable condition, toward an end. He applies the word "stochastic" to his music, from the Greek stochos, meaning aim.

"But here, I'll show you what I'm doing for Montreal." We hiked up the hill to his studio. He led us to three long tables, upon which were stretched several graphs glued together to make one long sheet which stretched the length of the three tables and hung casually over each end on to the floor. They were full of tiny dots in tiny squares; some were in color. "I proposed using colored screens, but they didn't like that, so I proposed another solution: a complex spider web which will be a transmitter of light sources. I call it Polytope (meaning many spaces)." Indicating an architectural draft with a network of lines stretched up and down, across, and in curves, all intertwined, he expanded in his quiet way:

"A family of cables is coming from this beam. There are five families which are penetrating each other-straight taut cables on which will be the light spots. The light spots are done with light flashes of xenon gas. They have no filament. Electricity goes through the gas and lights it, like lightning. The spots will be white, with very little blue and green. Very beautiful. It makes a kind of cold light, which lasts a very short time. There are also blues, greens, and reds. The light of each is almost 1,000 white flashes. Unfortunately, it will not be too strong. I would like it stronger. But it will depend on the hour of the day. During the night it will be much more efficient.

"I have designed each of the five cable forms separately, in order to place each light spot exactly." He pointed to the wall which he had covered with drawings of odd, striated shapes. "There they are. One is shell-shaped, another comes down from above." It looked like the view from the top of a circus tent if



#### " 'I think that this is the first time that such a problem has been studied in this way....'

one were an acrobat standing on the crow's nest poised to swing on the next trapeze.

"There are 1,200 light spots" he added. "Each one is independent of the others. They can do only two things: be lit or be unlit. There is a center which gives the signal for each light. The command comes through photoelectric cells. I have as many photoelectric cells as light bulbs in space. That is, 1,200 independent circuits. They are stimulated by a film coming from a projector. On my film there is one place for each cell. If there is a hole there the film is black, and if there is only one hole the light passes through. So a corresponding bulb in space will be lit. *Voilà!*"

E flicked his fingers out like spokes in the air and continued, "There are twenty-four images in each second. If I want it to remain at least three seconds, I just make this hole, or window, on seventy-two consecutive images. I have to give the behavior for each spot through all the seven or eight minutes during which the spectacle lasts, which means I have to give information" (here he took out his slide rule) "about 12,000 bits" (a bit means a piece of information, whether it is yes or no). "Four hundred and eighty seconds in eight minutes. During each second I have to define the twenty-four images. It makes-ha, ha, ha-14,400,400 bits.'

"Now we come to the light score." He indicated the graph on his drawing board. "Each millimeter corresponds to a very special lamp in space. There are about 700 images on one page, which makes about twenty-nine seconds and forty images. In this family there are eighty-one cables. The family name of the cable is East. The number of the cable is, for instance, 50. The number of the light bulb is 3. You have, then, E 50 F 3, where F means flash. The first cable has eleven lights on it, blue, blue, red, flash. The second cable has only four. The spacing is arranged stochastically, so I could do what I wanted. The lights must be freely and dissymmetrically dispersed because it is too strong. I can not have a very great density because of the cost, so it is in my interest to spread them out so they don't really have any particular form.

"This is the scheme: During about twenty seconds there is a play on the East. Then during about forty seconds there is a distribution of the levels. There are 1,234 lusters with different rhythmic pictures. The rhythmic pictures move from one place to another, across one another, like a culture of microbes. The third phase is the inversion from one level to another level of these rhythmic pictures-a kind of conflict. Then dominating rhythmic pictures. This is only flash here, lightnings." He whistled, not too loud. "It is called the injunction phase. I have analyzed this composition by phases. There are many movements that go like this." He waved his hand in choppy motions. "Because of the lagging impression of the retina you can make a discontinuous light effect a continuous impression.

"I think this is the first time that such a problem has been studied in this way, as pure light composition in time. Of course, you have the films, but never in space, and with such little and sober means. I have really only used the white, blue, and red. It is not because it is French," he said, laughing.

"The music is not compromising. It is not in phase, but it is not opposite. You can not have the music go 'boom, boom' when the lights flash 'boom, boom.' That would be stupid." He grabbed a long chain suspended from the ceiling and swung back and forth a few times on it as gracefully as a prehensile animal in space; then he leaped off and heaved a huge bag of coal into the stove. "This is a kind of visual music in space."

He began to dream a little. "Maybe I will put a dancer in at a certain moment. Maybe when there is a terrifying simultaneous *tutti* of the flashes." Then, returning to more concrete thoughts, "This will be given ten times a day for six months. That makes about 2,000 times." We couldn't help thinking what a shame it was he would not receive royalties per performance. "My publisher, Boosey and Hawkes, has asked for the rights to it, but I doubt that anyone will get rich on it. Maybe it will be a catastrophe."

Mrs. Xenakis, who had been measuring spots all this time, noted that there was an error in calculation and sighed that she had been working on that page for three days. We wished him smooth going, optimistically, as we left. "I hope not; I hope it will not be smooth at all," he answered, but then reflected a little sadly, "but I am afraid it will not be too shocking. Too bad."

## On Discovering Szymanowski

#### By OLIVER DANIEL

ISCOVERY HAS ALWAYS been a lure to imaginative men, and music-lovers are no exception. There have been many musical discoveries or rediscoveries made during the past decade: Vivaldi, Ives, Nielsen are obvious examples, and there will surely be more to follow. The latest may be Karol Szymanowski. A richer unmined lode than his music is hard to come by and, thanks to the vision and enterprise of Ars Polona, much of it is available on a series of recordings. They are on the Muza-Polskie Nagrania label and one set of four discs includes concerti, symphonies, vocal works, a fascinating quartet, and some solos; another, the complete recording of his opera King Roger, performed by the Warsaw State Opera conducted by Mierzejewski.

There was something patrician about Szymanowski; it looks out from every photograph of him that is included in the elaborately printed brochure which accompanies the recordings. It is evident, too, in the little disc that contains excerpts from comments he recorded in Prague in 1932 at the first Czech performance of his opera there and at the premiere of his ballet *Harnasie* on May 10, 1935.

Szymanowski was born on his father's estate in the Ukraine. His mother was a baroness belonging to a family of Swedish origin. Both parents were musical and Szymanowski began his music training early. A childhood injury kept him from attending school and he received all of his general education at home. This influence seems to have colored his life and furthered his introspective bent. At nineteen he went to Warsaw, where he studied privately with two Poles, Zawerski and Noskowski; five years later he moved to Berlin.

Szymanowski was intellectually acquisitive and highly intelligent. He rapidly acquired an impressive command of his musical craft and immersed himself in all of the new music and trends that moved about him. It is not uncomplimentary to observe his eclecticism and it is fascinating to observe the evident influences that touched him. We can observe in a somewhat consistent sequence those of Chopin, Scriabin, Strauss, Reger, Stravinsky, and Ravel, and still admire the individuality of the man clearly commanding the music.

Szymanowski was a man with wideranging interests that included the ancient cultures of Greece, Rome, the East, and Near East. His own writings included many literate articles and a complete novel called *Efebos* which, excepting a single chapter, was destroyed in the Warsaw uprising of 1944. He traveled widely and even visited America in the Twenties.

HE only works of his to achieve any substantial recognition are his brilliant violin piece, Fountain of Arethusa, and a few of his mazurkas, though his Symphonie Concertante for Piano and Orchestra and his violin concertos occasionally turn up on orchestral programs. Like Chopin, Szymanowski had a strong and enduring affection for Poland and, while folk elements do not really seem to constitute a dominating influence, Szymanowski once wrote: "The law has worked itself out in me according to which every man must go back to the earth from which he derives. Today I have developed into a national composer, not only subconsciously but with a thorough conviction, using the melodic treasures of the Polish folk." In defining his creed, he also stated: "I recognize artistic traditionalism as a very important and valuable factor, as a starting point, as-let me say-a good musical education. Our aim, however, is not 'yesterday' but 'today and the morrow'-in other words, creativeness and not confinement to achievements already acquired."

Szymanowski wrote his Second Symphony in B flat between 1909 and 1910, at a time when he was influenced by both Richard Strauss and Max Reger, and at a time when he lived variously in Leipzig and Berlin. In a letter, he wrote that "The Symphony will appear thus: the first movement is in the grand manner, the second movement—a theme and nine variations, an adagio and finale with a fugue." Straussian elements so dominate the opening that there seems to be little of Szymanowski in the act, but the succeeding sections



Karol Szymanowski—"... a national composer, not only subconsciously but with a thorough conviction...."

speak with more originality despite a marked Regerian accent. The variations are skillful and exhibit Szymanowski's effortless orchestral mastery. But in the end they are a bit too much, and, by the time the fugue wends its weary way, one wishes Szymanowski had learned the virtue of brevity. The sin is the same as that committed by Reger when writing his over-long variations and fugues-the *Hiller Variations*, for example.

Following the Symphony one discovers a different aspect of Szymanowski's work: his vocal writing. It is striking, rich, warm, and quite as beautiful as anything written during that period. Its kinship is with the Russian vocal literature and it is every bit as fine as the best of it. Roxana's aria from his opera King Roger is a magnificent display piece with long, Italianate cantilena lines.

A second work, the long extended song "I am and I weep," is less attractive, but the fragments from the *Litany* of the Virgin Mary for solo voice, chorus, and orchestra are beguiling pieces. Magic is the element these fragments possess and in the superb performance by Stefania Woytowicz, and the orchestra and chorus conducted by Witold Rowicki, they stand out as some of the best vocal music of the transitional era leading from the nineteenth to the twentieth century, and have mo-