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Background and performance considerations of Iannis Xenakis' "Psappha", for percussion solo

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BACKGROUND AND PERFORMANCE CONSIDERATIONS OF IANNIS XENAKIS' PSAPPHA, FOR PERCUSSION SOLO

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ABSTRACT

The works of Iannis Xenakis combine the influences of mathematics, architecture and music. Xenakis views these not as three separate worlds, but one entity resulting from logical thought. Through his work with stochasticism and other compositional techniques, Xenakis has broken new ground in twentieth-century music.

In 1976, Xenakis was commissioned to write Psappha, for Percussion Solo, a work for membranophones, metallophones and wooden idiophones. This paper examines the characteristics of the work, the required instruments and their positioning, and the technical demands presented.

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CHAPTER I

Xenakis' Background

The purpose of this paper is to examine the work Psappha, for Percussion Solo by Iannis Xenakis. This exciting and challenging piece is unique in several ways. First, the printed music to Psappha does not specify exact instrumentation and the performer may choose unusual timbres. Secondly, the piece requires advanced percussive technique to realize the music. In making these choices intelligently meeting the technical demands efficiently, it is necessary to survey the printed resources dealing with the solo and to study the background of the composer. Only through these means can one gain appropriate insight into Xenakis' intentions for this exotic creation in sound. A recent biography by Nouritza Matossian provides much of the following information.

Iannis Xenakis was born in 1922 in a small town along the Danube River in Rumania. His father, a Greek businessman, was one of the many Greeks living in the town of Braila. His parents were both music lovers--his father fond of opera and his mother a pianist and flautist by avocation. Xenakis' mother died when he was five years old and his father raised Iannis and his two younger brothers. At age ten Xenakis was sent to the Greek island of Spetsai to attend a boarding school that was popular among Greeks who were living throughout Europe. It was here that the composer first discovered his love of reading and other intellectual pastimes. Initially this happened when he sought refuge in the school's library from bullies

who picked on him, then increasingly for his own enjoyment and fascination. He later rekindled his interest in music when the school hired a new headmaster, an Englishman with a gramophone and a large collection of records, who befriended Xenakis.

After boarding school, Xenakis tried to enter the Greek Polytechnic school in Athens, only succeeding after several attempts at the entrance exams failed. After successfully qualifying for the prestigious school, Xenakis' education was further delayed by the outbreak of World War II, which periodically closed the Polytechnic. In fact, it took Xenakis a total of 7 years to receive his engineering degree. During the war, Greece was occupied by the forces of Italy, Bulgaria, and Germany starting in October of 1940 with the Italian invasion. Xenakis was involved in several groups that actively demonstrated against and resisted the occupation. The strongest resistance group soon became the Communist party and it was within this organization that Xenakis found a home. In December of 1944, Xenakis was for the first time involved in actual fighting when he joined a student brigade. During one day's fighting, the building that Xenakis was in was hit by mortar fire and he was severely injured. His jaw was broken, his palate split, and his left eye put out. Fortunately, he was taken to the hospital (instead of being left for dead by the enemy) and on New Year's Day, 1945, had three different reconstructive operations.

After the war ended, Greece was overtaken by the British and any Communists, even those who fought the Nazis, were driven out.

Xenakis found himself bound for France with forged papers. His luck soon turned for the better in Paris. In 1948 the training he received at the Polytechnic helped him acquire a position with Le Corbusier, the famous architect.

It had been Xenakis' original intention to stay in Paris only temporarily. He wished to join his younger brother in the United States and study physics and music. Xenakis changed his mind, however, after realizing that Paris offered him a fertile environment in which to work.

> *Paris is a kind of contemporary Athens. France is without doubt the country closest to my way of thinking and behavior. And then there is a strong historic link with Greece...The past counts for much with me-links with the past. I have no sympathy with those who reject it* (Bois 8).

Xenakis' first duty with Le Corbusier was as an engineer performing calculations for the plans of a huge apartment complex the famous French architect was designing. Xenakis viewed these duties as somewhat dry and uninteresting, but given the state of France at the time--unemployment, poverty and civil unrest had been brought on by the war--he was lucky to have a job. Xenakis did not become a naturalized French citizen until 1965, and at this time was still hiding from a death sentence for his resistance affiliations in Greece. Fortunately, he was fairly anonymous among Le Corbusier's staff.

Le Corbusier tackled each architectural project with a team approach. He lead the teams and usually had the first ideas and sketches; from there, anyone on the team could interject ideas in large-group discussions. Xenakis was at first quiet and withdrawn during these discussions, but the few times that he spoke out, the group listened intently to his suggestions and ideas. During this post-war time, construction in and around Paris was booming and the firm worked on many projects concerning housing and urban planning in general.

From the need to plan mass numbers of structures, Le Corbusier invented a generalized concept of proportion. He called it the *Modulor* (Matossian 39). Using the Modulor, the proportions of a man standing upright with an extended hand is used to design buildings. Not only was the concept used for the height of ceilings, doorways, and the placement of windows, all of the proportions of a structure could be designed using the Modulor. The concept itself is similar to the Golden Section, a proportion long used in architecture, art and music. Xenakis collaborated on the two books Le Corbusier wrote on the subject.

> *During his visits to Greece and Egypt, Le Corbusier measured buildings to find the Golden Section occurred repeatedly in them. Later it (the Golden Section) began to enjoy a revival with a book published by Matila Ghyka in 1928...Le Corbusier referred directly to this publication in his book Modulor II* (Matossian 40).

In 1949 Xenakis' life was to change in a new way. He met his future wife, Françoise, on a blind date. The two had much in common, including similar war-time experiences and a reclusive nature resulting from psychological trauma. She moved in with him in 1952 and soon after they were wed in a casual civil ceremony. While elements of Xenakis' career and social life were taking shape, one piece of the puzzle was still missing--his musical fulfillment.

It is evident from notebooks of this period that Xenakis worked hard to achieve a familiarity with traditional harmony and counterpoint. Sometimes this was accomplished on his own, and sometimes with the help of a teacher whom he would ask to comment on his exercises, though he was reluctant to settle with any one teacher. Honegger refused to listen to his works because they contained parallel fifths and parallel octaves, even though Xenakis said he liked the resulting sonority and had included them on purpose. An encounter with Darius Milhaud in 1949 had met with a similar result. Attempts to study at the Conservatoire National were more profitable for Xenakis. Nadia Boulanger, though a representative of the conservative neo-classical school, was interested in the composer's work. He spent much more time, however, with Olivier Messiaen.

Messiaen offered musical advice that differed from that of other teachers. Although Messiaen admits he would never give the same advice to anyone else, he told Xenakis not to worry about counterpoint and harmony. He told the young composer that a

person with such a vast mathematical background should take advantage of that in his work. This assurance was just the spark Xenakis needed.

Meanwhile, at the firm of Le Corbusier, Xenakis was moving into the inner circle of architects and engineers. By 1954, he was one of the head designers on the Couvent de la Tourette, a monastery and temple for the Dominican Order of Lyons, and in 1956, single-handedly designed the Philips Pavilion for the Brussels World Fair. While working on the Couvent de la Tourette, Xenakis found striking parallels between architecture and music. In the former, the designer tackles the element of space, much like the composer uses time. Metastasis, a seven minute composition written during this time was to become Xenakis' first success. The piece used sixty-five separate string parts with no doublings. As Matossian says, "Metastasis was the first step he took in initiating a new 'brutalism' in music which relied not on emotional values but on the display of technical resources in a totally new way (61)." These resources included many elements from construction including mass, surface and straight line. In Metastasis, these concepts translated musically into stunning new uses of *glissandi*, *pizzacatto col legno* and *arco* techniques.

Another life-changing experience Xenakis had at this time was meeting Hermann Scherchen. Scherchen (1891-1966) was the German conductor the New Grove Dictionary hails as "One of the twentieth century's outstanding musical pioneers (16; 630)." These

accolades come primarily from his premiering the works of Varèse, Schoenberg, Webern, Hindemith and Stravinsky. Scherchen, it is said, could tell at a glance if a score was worth pursuing, and upon his first inspection of Metastasis in December 1954, he was indeed interested.

In describing his theories of stochasticism, Xenakis refers to the "song of the cicadas in a summer field (Cope 173)," or a protest mob with their chants and noises. At first it would seem that these noises are random, but the probabilities of the noises are basically binary. The individual cicada can sing or not sing, the mob member can cry out or not cry out. These basic yes or no, 0 or 1 choices can be simulated on a computer. The whole equation becomes more complicated by other factors, however. The cicada sings when he hears his closest neighbor doing likewise; the mob member gets caught up in a chant and the "noises" then have a more logical progression. Even these complicating factors could be simulated on computers--especially those that began to be available to engineers in the mid 1950's.

The type of calculations used by the Swiss mathematician Jacques Bernoulli to predict these large-group events were harnessed by Xenakis to form compositions with masses of sound. Xenakis termed the resulting works, which were almost always realized on traditional instruments, *Stochastic* (Morgan 392; Cope 104). This evolution was only natural for Xenakis. When faced with a problem in architectural creation concerning the properties of building

materials, he would turn toward physics and mathematics. Why not utilize the same resources for creations in sound?

Xenakis' awareness of the organic properties of his materials along with a reliance on mathematics was to aid him in the creation of his most famous architectural work. In January of 1956, Le Corbusier contracted to build a structure for an exhibit at the Brussels Worlds Fair to be known as the Philips Pavilion. This multi-media display included the playing of taped music by Varèse in its interior. The original design sketch made by Le Corbusier was roughly the shape of the human stomach (Matossian 110). His largest concern was an uninterrupted flow of traffic timed to circle the structure and exit in eight minutes--the length of Varèse's composition. It was at this point that Xenakis took over.

Xenakis developed a plan for a structure containing a series of hyperbolic paraboloids--saddle-shaped figures that curve in two directions. The sides of the resulting structure also curved in two directions and looked like an oddly-shaped tent, while the structure's floor-plan still resembled the "stomach." Since Le Corbusier was out of the country attending to other business, Xenakis handled all details of the design and construction. Upon the Fair's opening, the public was intrigued by the structure while many critics were put off by its sheer oddity. Despite Xenakis' full involvement with the project, his employer intended to take credit for the Philips Pavilion, thus causing a conflict that would eventually split the two colleagues.

By the 1960's, Xenakis was content with his life in Paris, although he had traveled to the United States on occasion to teach the subject of computers and music at Indiana University. At the University of Paris, Xenakis founded a group of mathematicians, anthropologists, philosophers, and other thinkers who studied mathematical constants in music. The group was called L'Equipe de Mathématique et Automatique Musicales.

Xenakis gradually gained favor among the European cultural community and was especially popular in England. In 1976 he was called upon to compose a piece for solo percussion for the English Bach Festival. Xenakis worked with Sylvio Gualda, a percussionist who had been trained at the Paris Conservatory and who was working at the Paris Opera. For Gualda, he composed a piece for membranophones, metallophones and wooded idiophones entitled Psappha, which premiered at the Festival.

Most of Xenakis' works are titled with Greek words or phrases. As Xenakis tells Mario Bois in a 1967 interview, "I try to sum up in a nutshell the idea which has dominated the work (19)." For example, Metastasis means 'after the standstill' as many pitches move by means of glissandi (18), and Herma means 'embryo,' which refers to Xenakis' first use of calculus in a composition (18). The title Psappha is a different spelling of Sappho (Emmerson 25), the ancient Greek poetess who first captured Xenakis' imagination in his boarding school days.

CHAPTER II

Overview of the Work

Before looking at the structure of Psappha, let us look briefly at the notation employed by Xenakis for this work. The music for Psappha is printed on sheets slightly larger that 11 x 17 inches. Each instrument is indicated by a letter and number designation, ranging from A1 to F3, on a horizontal line. This horizontal line is divided by hash marks that are numbered at every tenth hash resulting in 70 vertical divisions per score line. These hashes serve as pulse dividers which Xenakis used to indicate tempo with standard metronome markings. A dot which is placed on or between the vertical hash indicates the playing of the instrument of the corresponding horizontal line.

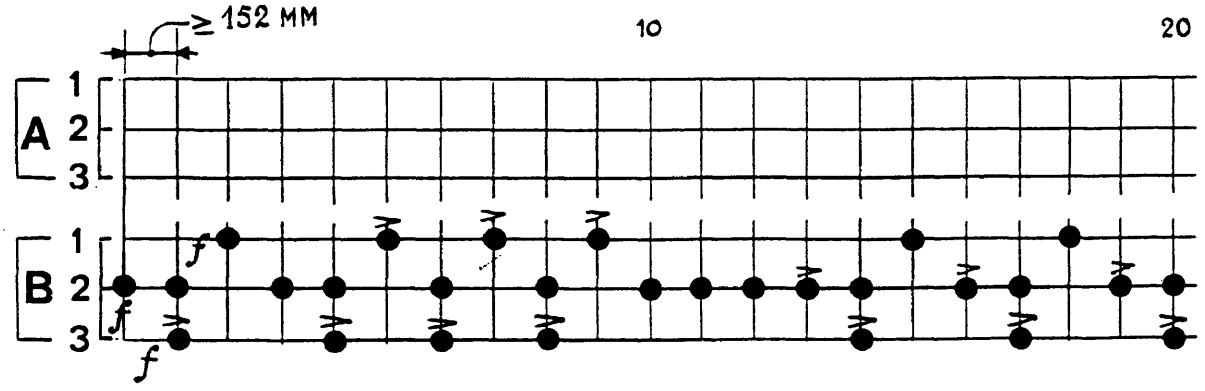

Fig. 1. Entrances of the B voices at beginning of Psappha, measures 1-20.

Xenakis has used many systems for composing his works, and many are largely based on relationships and forces of entities outside music. Metastasis was influenced by the cries of an anti-Nazi demonstration, and his stochastic theories of music are modeled after movements of gas or blood molecules. In other pieces, game theory is used, but in Psappha, a different theory is at work. The name Psappha is the Aeolic spelling of the name of the Greek poetess Sappho, who was born c. 610 B.C. (Robinson 21). Just as Sappho's stanzas changed and evolved rhythmically throughout a poem, Psappha's rhythms are ever-changing and interacting under Xenakis' theory of sieves. Sieve theory is described in Xenakis' book Formalized Music as a theory allowing the composer to express a wide range of sound characteristics, "...in terms of logical (hence mechanizable) functions (190)." Barry Larkin, in a recent article in Percussive Notes, gives his opinion of the structure at work in Psappha.

"I feel," says Larkin, "that the work is a combination of intuitive and preconceived compositional devices (67)." The preconceived devices in question are four sieves that Xenakis uses in Psappha. The intuitive devices refer to Xenakis' placement of the different sieves as well as use of tempo, dynamic markings and accents throughout the piece.

The material governed by the first sieve occurs in the B voices at the beginning of the work (see Fig. 1). The notes appear on the

vertical hashes, but not between them. Additionally, two simultaneous attacks occur, but never three. Sieve 1 material can be seen from measures 0 - 47, with the exception of measures 10 - 13. Sieve 2 material is visible in the A voice in measures 47 - 59 and contains notes between the vertical hashes with no simultaneous attacks.

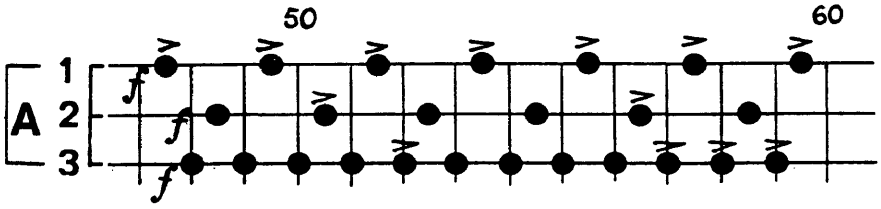

Fig. 2. Sieve 2 material in Psappha, measures 47-59.

Sieve 3 material consists of repeated notes of the same voice with no notes between the hashes and no simultaneous attacks. This material can be seen interspersed with sieves 1 and 2 in the first half of the piece (such as measures 10-13), as well in the section beginning at measure 1750. The fourth sieve Larkin mentions dominates measures 2023 - 2173 (65). This sieve is similar to sieve 3 with multiple attacks per point (see Fig. 11). Sieves 3 and 4, according to Larkin's diagrams, contain no simultaneous attacks but

do overlap in places, making two sets of Sieve 3 material appear at once.

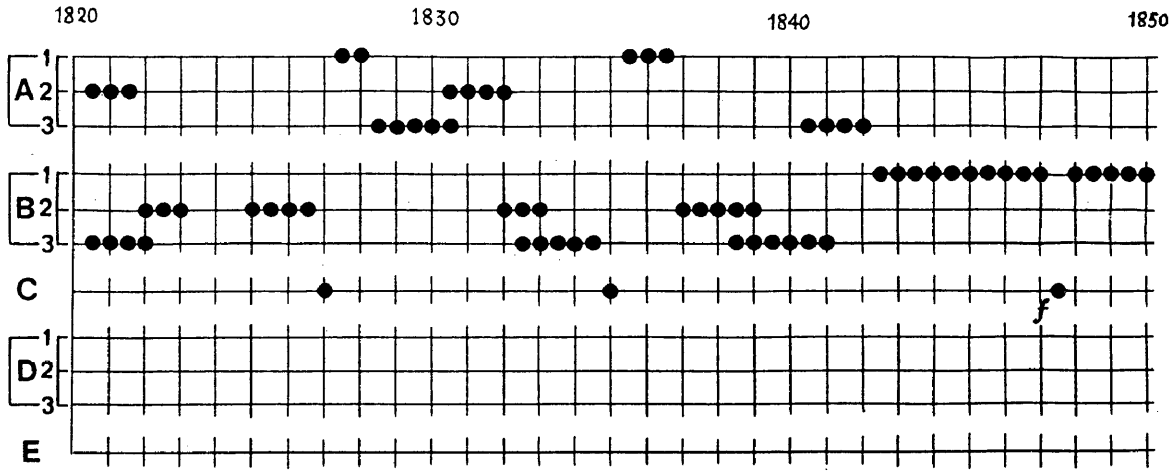

Fig. 3. Overlapping voices containing sieve 3 material, Psappha, measures 1820-1850.

Sieves 1 and 2 often appear in opposing voices as in the first 300 measures of the work where sieve 1 is almost continuous in the B voices while sieve 2 material comments in counterpoint with the A set. Similarly, measures 380 - 518 contain a section with the A voices dominating with sieve 2 material and sieve 1 material in augmentation beneath it in voice B. From measures 740 - 990 sieve 1 plays against itself in voices A, B, and C in what Larkin terms a three-part fugue (65).

The tempo of Psappha ranges from 110 to 272 pulses per minute. The amount of space left by the composer, however, also

affects the perceived tempo. The section beginning at measure 740, for example, marked at 272 pulses per minute, does not seem that fast because of the augmentation of the sieve 1 material. By contrast, the abundance of space at measure 990 heightens the effect of the slower tempo of 110 pulses per minute. In example 3, 20 hash marks worth of "rest" are not uncommon.

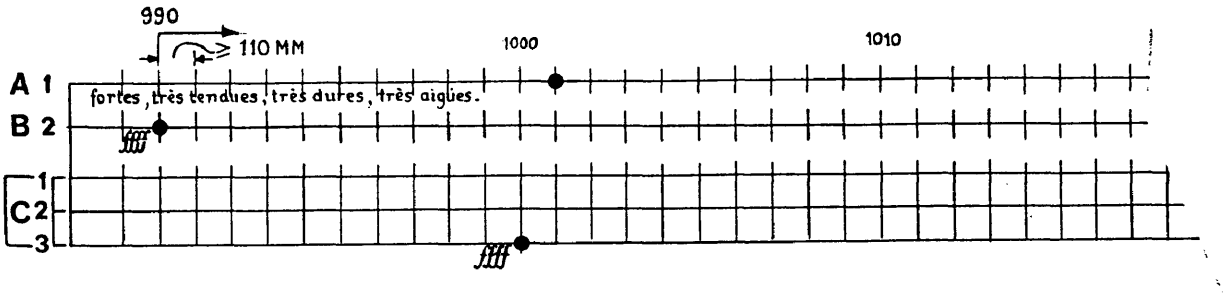

Fig. 4. Measures 990-1020 of Psappha.

Another of the preconceived devices at work in Psappha is the use of accents. Xenakis explains specifically how to interpret these accents in the explanatory note (Xenakis, Psappha 9). Along with the normal meaning--a sudden change of weight or intensity--the accents can indicate to the performer to simultaneously add another tone to the beat. Use of the latter and resulting performance considerations will be discussed in another chapter.

CHAPTER III

Instrument Selection

The score of Psappha calls for a variety of categories of instruments. Xenakis indicates, in table form, three groups of three skins or woods, three high-pitched metals, one neutral metal, and three low-pitched metals. The instructions are not specific, however, as to what instruments to use. Rather, a general description of those instruments that might work well for each category is indicated.

> Skins:
>
> very high pitched bongos, tom toms with 2 skins which are out of tune, but in harmony, very low-pitched timpani, bass-drums very wide, African drums, congas.
>
> Woods:
>
> tree trunks, simantra, round Japanese blocks.
>
> Metals:
>
> hardened and resonant steel bars, steel rail, thick plates, tam tams or gongs struck on the edge with a metallic bat or a hammer.

Fig. 5. Explanatory Note from Psappha (Parnell-Smith 1).

Aside from suggesting woods, skins and metals, Xenakis leaves the choice of which instrument to use for each voice up to the performer. At first inspection of the instructions page, the suggestions appear to correspond to a specific voice, but a closer look will reveal the instructions in a narrative format and no one

instrument is mandated. To complicate matters , there is no distinction between woods and skins in the instructions. It is unclear if some of the instruments in voices A, B, and C are to be woods and others to be skins, or if two sets are to be used and the player is to switch in mid-piece.

One instruction that appears at measure 985 (see Fig. 7, chapter 4) instructs the performer to use "strong sonorities, very taut, very hard, very sharp (Page 1)." At this point, the predominant voices are A1 and C3 - the highest and lowest of the skins/woods. Some performers, for example, Gert Mortensen, on his 1981 Grammofon recording, changes his A1 voice from a high pitched membranophone to a wooden sound. Sylvio Gualda, in a 1989 interview with Michael Rosen also advocates changing certain voices.

> *I use wood in certain places where I think the music is more tragic than dramatic and Xenakis was very pleased...the composition seems like Greek theater to me.* (34)

Gualda changed to a wood sound for practical reasons as well--he was breaking too many bongo heads in certain passages!

Another issue arises in the composer's instructions at measure. 204. Xenakis asks that "the B voices descend progressively toward the bass of C3 until they reach measure 519 (Page 1)." This presents a very complex problem to the performer if a gradual change of pitch is involved because few if any wooden instruments available can accommodate a change of pitch. Certain membranophones, timpani for example, can easily change pitch during performance through use

of the pedal mechanism. A second possible solution--roto-toms, drums made to simulate timpani, can accommodate a change of pitch by turning the frame of the drum, clockwise to raise the pitch and counterclockwise to lower the pitch. A third solution would be to have more than one drum per voice and switch to lower pitched instruments as the section progresses.

Unfortunately, none of the above solutions presents a meaningful or practical answer to the problem at hand. The composer, in a 1990 interview with David Yoken, rules out the use of timpani. "The pedal timpani, for example, have too nice, too soft a sound (54)." Having to rotate the roto-toms manually would interfere with the playing of the music in the passages in question, and having additional drums in an already crowded set-up would create logistical problems for the performer. Xenakis, in the aforementioned interview concedes the difficulty of this particular instruction.

The metal instruments called for in the D, E, and F categories present a challenge to the performer. For these sounds, the composer asks for steel bars or plates, or the tam-tam or gong. Through his work as an architect, Xenakis had access to construction sites throughout Paris. It was here that he and Gualda searched unusual metal materials in order to create sounds for Psappha. Similar searches of junk yards and welding shops can prove equally profitable. The author was able to obtain graduated lengths of channel iron from the welding shop of Harold G. Butzer Mechanical

Engineers of Jefferson City, Missouri. Channel iron in long beams is used as a building or reinforcing material. The bottom of the beam is flat with sides rising up to form a U-shaped channel. When struck with a wooden or hard rubber mallet a pitch with many overtones is heard. Three pieces, each 8 inches wide, with lengths of 6 inches, 6 $^{1}/_{2}$ inches, and 9 $^{1}/_{2}$ inches respectively, produce three sounds with similar overtones and graduated pitches.

A	1	Woodblock (alternates with 4" roto-tom)
	2	high bongo
	3	low bongo
B	1	12" tom tom
	2	13" tom tom
	3	13" tom tom
C	1	16" tom tom
	2	20" bass drum (with pedal)
	3	22" bass drum (with pedal) (doubles with 36" concert bass drum)
D	1	channel iron
	2	channel iron
	3	channel iron
E		cowbell
F	1	high brake drum
	2	medium brake drum
	3	low brake drum

Fig. 6. Author's instruments for Psappha.

When contemporary composers call for the use of brake drums, they are often to be struck with a metal hammer or hard xylophone mallet, simulating an anvil effect. Using a medium-hard rubber or wooden mallet on the center of the brake drum produces a higher pitched and more resonant tone.

The author's instruments for Psappha included a combination of standard and non-standard instruments. It should be noted that the four inch roto-tom functions as a substitution for a high pitched bongo and does not change pitch during performance.

CHAPTER IV
Performance Considerations

In the text Contemporary Percussion, by Reginald Smith Brindle, three notational systems are mentioned. All make use of standard rhythmic notations (values stated with stemmed or flagged notes). One system, the "line-score system" uses a separated line for each instrument or player (7). In Psappha, Xenakis uses a variation of the "line-score system." In this work, each line denotes one instrument, but the composer uses vertical hashes that make up a grid containing dots to indicate rhythm.

Brindle calls for the standardization of percussion notation, "so that a player does not have to adjust himself to a new notation with each piece of music (5)." Nowhere is this need for standardization illustrated better than in Psappha, because learning the notation is indeed one of first hurdles to overcome in preparing the work.

Xenakis' line-score system contains markings at every tenth hash with dots on and in between the hashes. This could translate into standard notation with quarter notes for the dots on the hash, and eighth notes for dots in between the hashes in $^{10}_{4}$ or $^{10}_{8}$. The issue of transcribing Psappha came up in an interview with Sylvio Gualda by Michael Rosen in the Summer 1989 Percussive Notes. Mr. Rosen asks if Mr. Gualda thinks the piece would be easier to play with measures and conventional phrases with bar lines. "I think that this (understanding the work's notation) is not the most difficult part (33)." This type of transcription with groupings of ten would also

have phrasing and agogic implications that are not present in the music as written by the composer. The groupings of ten do, however, form a counting aid which will be explored later in this chapter.

Because of the nature of the music and placement of the instruments, the majority of the piece can best be played with four mallets. A grip that works well in this situation is one in which the mallet shafts are crossed under the palm of the hand and the index finger is placed between the two shafts. In this grip, called a crossed-stick or Burton grip (after creator, vibraphonist Gary), the mallets are numbered from left to right (see Fig. 7). Using the Burton grip, any sticking combination is acceptable based on the musical context of the passage. The most common combination for passages requiring only two mallets is numbers 2 and 4.

Left Hand Right Hand

Fig. 7 Numbering system for Burton grip.

Some of the most concise and specific definitions of percussion terms have been made by Leigh Howard Stevens in his book Method of Movement for Marimba. In this volume, Stevens sets down specific nomenclature for the many intricate wrist and hand movements necessary for two-mallet and four-mallet technique. A

single tone produced by a single mallet is obviously, a *single stroke.* Two tones produced in succession by the mallets of one hand (1-2, 3-4, 4-3, or 2-1) comprise a *single alternating* stroke. Stevens defines a *double vertical* stroke as "one that produces two pitches simultaneously (32)." This stroke is named for way the wrist moves in a vertical fashion as the two mallets strike the instrument. It can be assumed that these terms, originated for marimba, also apply to tones produced from tom-toms or other idiophones.

In the opening statement of Psappha, Xenakis states the sieve 1 material on the B instruments. At measure 47, the A voices enter with two articulations per graph section (sieve 2), or twice as fast as the material in the B voices. The performer can play both voices simultaneously with 4 mallets. Two mallets are needed for the left hand (B voices) because double vertical strokes are called for in the part. The sieve 2 material (right hand) utilizes the two mallets to play the material at the indicated speed. This section, which is simply too fast to be played with single strokes, is better realized by employing single alternating strokes.

Performing this section requires great independence of mallets. The challenge is to keep the left hand steady in its rhythm while simultaneously playing the right hand part with the indicated accents. In this case (measures 47-60), there is the advantage that the right hand merely repeats a 4-3-4-3 sticking pattern. In other sections of page one, such as measures 203-210, the pattern is much less regular.

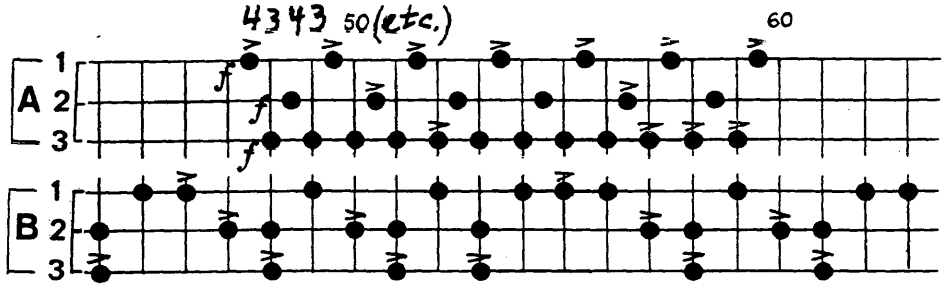

Fig. 8 First entrance of A voices, measure 47, Psappha.

Measure 203, and many other sections of Psappha, require independence of both limbs playing original material--as opposed to measure 47 where one limb plays a repeated pattern and the other limb plays the original material. This independence of limbs can be mastered by playing each hand separately, then slowly playing both hands together as in beginning piano or drumset technique.

There is an interesting similarity between the sticking of sieve 2 material played with two mallets in one hand and that played with both hands (see Fig. 9). In either case, a double sticking helps to avoid crossing mallets. In the aforementioned section beginning at measure 203, a 4-3-4-4 pattern can be used effectively. In measure 380, a section where the B voices are silent and both hands are free to play the A instruments, a R-L-R-R pattern keeps the hands from crossing.

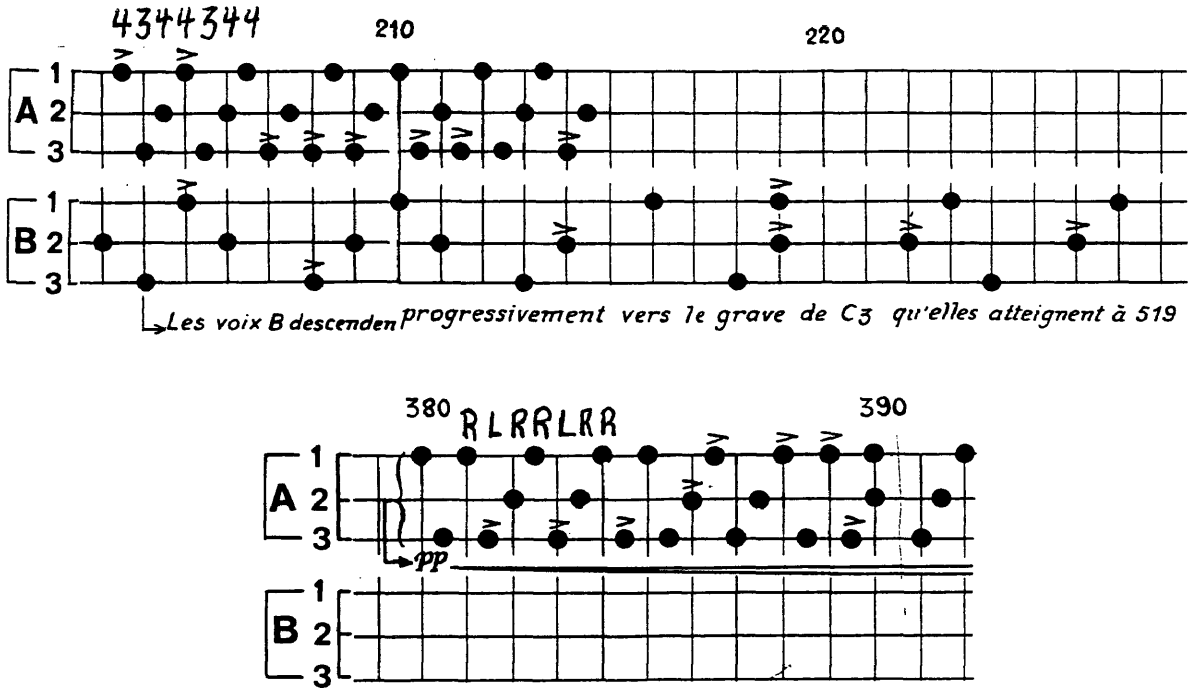

Fig. 9 Measure 203 (above) and measure 380 of Psappha.

One of the most technically challenging passages in Psappha is the section beginning at measure 2023 (see Fig. 11). At this point Xenakis indicates "2 or 3 coups par point (11)." At the given tempo of 134 pulses per minute, two strikes would be the equivalent of 16th notes. This figure first appears on A1, and shortly thereafter is applied to A1 and A3 simultaneously. It was suggested to Xenakis in an interview that the performer could alternate strokes on the instruments so that the cumulative effect would be 16th or 24th

notes, and he replied that he would much prefer simultaneous production of the rhythm (Yoken 54).

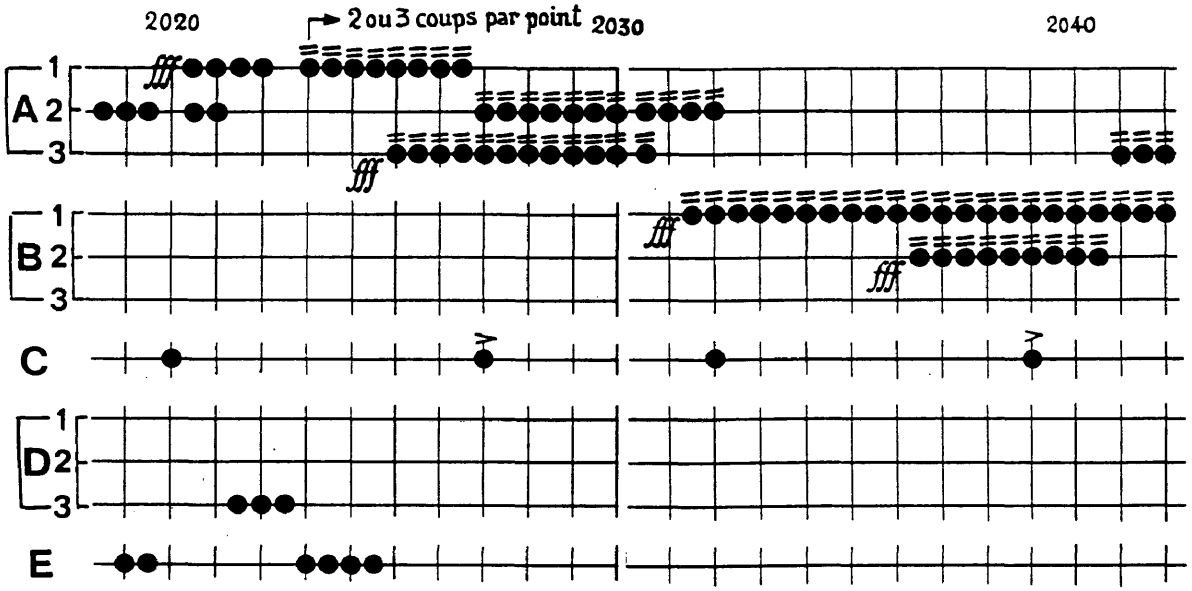

Fig. 10. Measure 2023 of Psappha.

To accomplish this is quite a challenge. The figure is too fast to be played with two mallets in one hand, and in some parts of the score, other figures occurring simultaneously require the use of performer's other hand. One possible solution is the use of a double surface system. Two sets of bongos (the instrument suggested for A1 and A2, for example) of identical pitch could be mounted with playing surfaces facing each other and the player alternates strokes between the two. This system not only accommodates the sixteenth-note type rhythms that occur on one instrument, but has possibilities for two sets of the rhythms to be played on adjacent instruments, leaving the other hand free.

This is a technique not often called for in standard percussion literature, however, and the problem then becomes controlling the upstroke. In playing most percussion instruments, the stroke of the implement (mallet, stick, etc.) is in a downward motion linked to an upward preparatory motion. In this double-surface system, the preparatory stroke is also used for sound production bringing into greater use the muscles that lift the implement. These muscles are not ordinarily used to produce sound, and controlling them in a musical context takes practice.

The only notable example of using two surfaces for playing in standard literature is the triangle. Here a smaller beater is used, the distance between surfaces is not more than a few inches, and the manipulations are usually accomplished with the fingers, or small wrist motions.

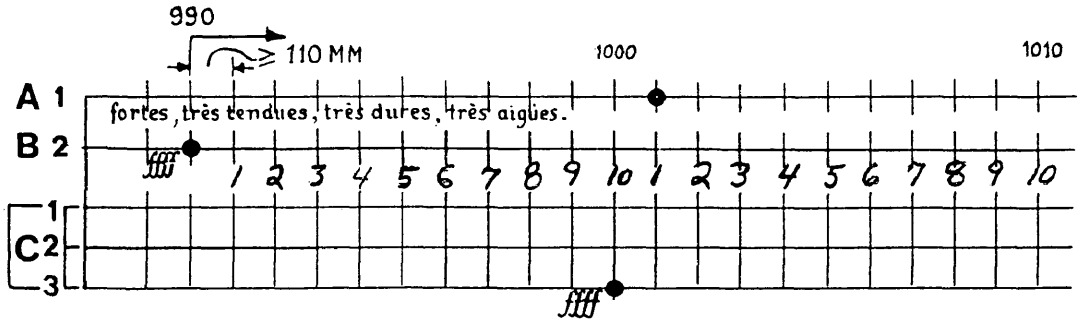

Fig. 11. Measure 990 of Psappha with counts marked in.

As mentioned previously, the largest role played by the ten hash markings is in counting for the performer, especially in the section at measure 990 where large amounts of space exist between attacks do these hash marks come into play. The performer can mark the hashes (1 through 10) to use as a counting aid.

CHAPTER V

Instrument Arrangement

The author's set-up for Psappha evolved from those for two standard pieces of the percussion solo repertoire, Inspirations Diabolique by Rickey Tagawa and French Suite by William Kraft. The scores for these works contain specific diagrams for the instrument set-ups called for by the composers. Both use a combination of snare drums, tom toms and bass drums positioned in an arc about the performer with the higher drums to the right. (This is opposite the normal positioning for the right handed trap-set drummer, but fairly standard for concert repertoire and the American method of timpani playing as well.) These pieces also make use of bongos placed outside the primary arc of drums and slightly to the right. This arrangement, if used for Psappha, is ideal for the opening of the work as it allows the A voices (bongos) to be played by the right hand as the left hand plays the B voices (tom toms).

The other instruments appear as an extension or variation of the Inspirations Diabolique/French Suite set-up. The D instruments (channel iron) are placed to the right also to facilitate right handed playing. The C1 voice (low tom tom) is just outside and to the left of the arc with C2 and C3 (20" and 22" bass drums) being played by means of a pedals.

The remaining instruments are the neutral and low metals. While only one E voice is called for, two instruments (cowbells) are

used--one placed at the player's right and one on the left. This facilitates ease of striking with either hand.

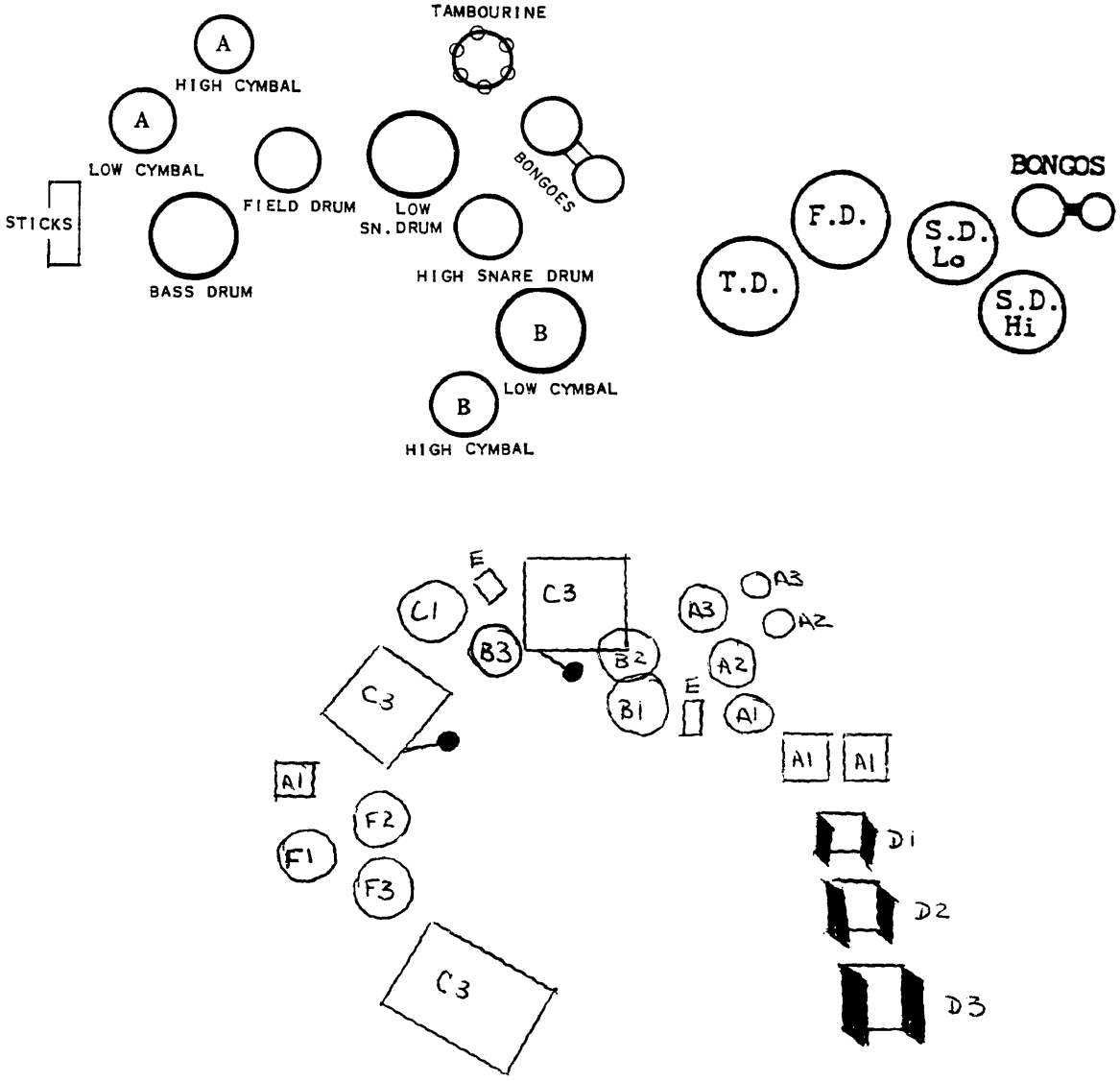

Fig. 12 Author's set-up for Psappha (bottom) as compared to set-up for Inspirations Diabolique (above left) and set-up French Suite (above right).

The F instruments (3 pitched brake drums) are placed far to the performer's left and set on a small trap table. Since these instruments are used in combination only with the C bass drums, which can be reached via pedal, they could be placed in a variety of locations. The brake drums are layed out in a triangle pattern to eliminate the need for cross-stickings. An additional C3 (concert bass drum) is added behind the performer, as well as a third A1 (wood block) at the performer's left for the passage beginning at measure 1000.

The next issue in the set-up of Psappha is the placement of the second surface.of the double-surface instruments. The considerations are the distance away from the first surface (or set of surfaces) and the orientation (vertical or horizontal) of the second set of surfaces. The distance between the surfaces should allow the traveling mallet ample acceleration to gain the force for the indicated volume, but should not be too great to allow repetitions of the stroke at indicated tempos.

The placement of the surfaces should be so that one set of surfaces could be played as comfortably as two. If two sets of bongos, for example, are placed so that the surfaces are vertical, and the mallet head travels horizontally, this would avoid the force of gravity on either stroke, but would possibly result in an uncomfortable playing position for the arm and elbow.

As a result of these considerations, the second set of surfaces was placed above the first set at a height of approximately ten

inches. A second set of bongos was placed upside down and angled slightly toward the performer with an extra tall bongo stand for A2 and A 3. Additionally, a woodblock holder was mounted in an inverted position for A1. Holding the woodblock in place with rubber bands provides support but does not noticeably deaden the sound. The channel iron has a built in second surface resulting from its shape so a second set of D instruments was not needed.

CHAPTER VI

Conclusion

The works of Iannis Xenakis combine the influences of mathematics, architecture and music. Xenakis views these not as three separate worlds, but one entity resulting from logical thought. Through his work with stochasticism and other compositional techniques, Xenakis has broken new ground in Twentieth-Century music.

In preparing the work Psappha, for Percussion Solo, the performer is given many choices. By surveying articles on Psappha and interviews with the composer and respected performers, we can intelligently make decisions on the selection and placement of instruments for the piece. Given the contrapuntal nature of the work, advanced percussive techniques such as the use of four mallets, pedal bass drums, and double surface playing is required. In providing the performer an opportunity to make these choices and solve the technical challenges, Psappha becomes a truly satisfying work.

Works Cited

Bois, Mario. Iannis Xenakis: The Man and His Music. London: Boosey and Hawkes, 1967.

Brindle, Reginald Smith. Contemporary Percussion. London: Oxford University Press. 1970.

Cope, David H. New Directions in Music, 2nd ed. Dubuque, IA: Wm. C. Brown Company Publishers, 1976.

Emmerson, Simon. "Xenakis Talks to Simon Emerson," Music and Musicians. Vol. 24, No. 9, May 1976, pg. 24-26.

Kraft, William. French Suite for Percussion Solo. Hollywood: Wolf-Mills Music, Inc, 1962

Larkin, Barry. "Performance Analysis of Psappha," Percussive Notes. Vol. 30, No. 2, August, 1992, Pg. 64-68.

Matossian, Nouritza. Xenakis. London: Kahn and Averill, 1986.

Morgan, Robert P. Twentieth-Century Music. New York: W.W. Norton and Company, 1991.

Page, Michelle. Written Interview. March 1, 1993.

Parnell-Smith, Juliette. Personal Interview. January 15, 1993.

Robinson, David. Sappho and Her Influence. New York: Cooper Square Publishers, 1963.

Rosen, Michael."An Interview with Sylvio Gualda Concerning Psappha," Percussive Notes. Vol. 27, No. 4, Summer 1989, pg. 32-36.

Sadie, Stanley, ed. The New Grove Dictionary of Music and Musicians. London: Macmillan, 1980.

Stevens, Leigh Howard. Method of Movement for Marimba. New York: Marimba Productions, 1979.

Tagawa, Rickey. Inspirations Diabolique. Greely, CO: Western International Music, Inc., WIM 45, 1965.

Yoken, David. "Interview with Iannis Xenakis," Percussive Notes. Vol. 28, No. 3, Spring 1990, Pg. 53-57.

Xenakis, Iannis. Formalized Music: Thought and Mathematics in Composition. Bloomington, IN: University Press, 1971.

---. Psappha for Percussion Solo. Gert Mortensen. Grammofon BIS-CD-482, 1981.

---. Psappha for Percussion Solo. Paris: Editions Salabert, 1976.