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THE ROLE OF CHANCE IN MUSIC:
ITS POTENTIAL AND ITS LIMITS

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ABSTRACT

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Many composers and music historians have discussed chance and music. Some have spoken as if chance could in no way be reconciled with musical composition; some have described compositional ideas and music as if even something purely the result of chance could be music; and some have talked of combining or synthesizing chance methods and methods of creating determinacy. After examining the influence of concepts of chance on modern science and art, I examine several aspects of the controversy about chance and its relation to composition and music.

In particular, I examine how this controversy relates to the thought of several composers, but most specifically, Iannis Xenakis and John Cage. I propose ways to distinguish between chance and indeterminacy, and by discussing the potential and limits of the role of chance in music, show what it has to offer composers, composition, and listeners.

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PREFACE

Traditionally, art has been regarded as a field in which chance had little or no role to play. By making decisions about what to choose and what to discard, the artist creates order out of chaos, and consequently, the role of chance is supposed to be reduced in the process of creating order. In musical composition, historically, composers have tried to control every aspect of their music as precisely as possible. From this point of view, some contemporary composers' concern with chance has been regarded as an unusual phenomenon.

Many composers and musicologists have discussed chance and music, but they rarely attempt to clarify the concepts, or the relationships between the two. In these discussions, terms abound: indeterminacy, determinacy, randomness, the aleatoric, and of course, numerous ways of using the term "chance." Frequently the terms are used inconsistently, even inappropriately, without regard for any kind of historical continuity within the concepts behind the terms, and without any attempt to clarify the special usage of these terms in discourse about music. Some have spoken as if chance could in no way be reconciled with musical composition; some have described compositional ideas and music as if even something purely the result of chance could be music, and some have talked of combining or synthesizing chance methods and methods of creating determinacy.

Motivated by the abundance of confused, and often contradictory, implications that permeate these discussions, I decided to investigate pertinent aspects of the relationship between chance and music. The

investigation focuses on an analysis of the potential and the limits of the role of chance in musical composition. I think the results of my investigation show in what way the role of chance can be useful in creating music, and thus, will help composers use its potential, without ignoring its limits. I also think the results of my investigation show how the relationship between chance and music can be examined without unnecessary confusion and unintended contradictions.

The investigation concentrates on the compositional ideas and music of John Cage and Iannis Xenakis. I chose Cage because I found the most serious contradictions in his statements about chance music. I chose Xenakis because I viewed his way of composing, based on statistical methods, as one appropriate way of developing the potential of the role of chance in creating music. In the investigation of these two composers, I found that, paradoxically, Xenakis' compositional ideas could provide a better understanding of Cage's music than Cage's own ideas.

For the purpose of examining their music in light of their compositional and philosophical ideas, I focused on one piece by each composer, *Variation II* and *Pithoprakta* respectively. *Pithoprakta* was chosen because that piece readily shows how Xenakis' concept of chance is reflected in his music. *Variation II* was chosen because I found that this piece revealed the most fundamental contradictions between Cage's ideas and their musical results. I also found that this piece clearly demonstrated how Xenakis' concepts of chance in relation to music provide a better point of view for understanding the musical results created by Cage than the point of view espoused by Cage in his philosophical arguments.

INTRODUCTION

Concern with chance has become characteristic of modern mathematics, physics, philosophy and art. Probability theory and statistics in mathematics, the kinetic theory of gases and quantum mechanics in physics, and existentialism are all related to this concern. In the arts, happenings, action painting, and chance music are also related to the concern about chance. However, in the arts, this concern has been treated as unusually threatening, in part, because art traditionally has been regarded as a field in which chance had little or no role to play, a field in which chance, especially in a final result, has been considered the negation of art itself.

From a historical point of view, the concept of art has included the idea that all artistic creations are, in many important ways, the result of a creator's choices. In modern times, this concept of art has been expressed repeatedly in a number of different, though related, ways:

> Where there is no choice there is no Art. Wherever a person can choose a Thought, the means whereby to express that particular Thought, and one way of several to apply the chosen means, there Art may be achieved.[1]

> All art presupposes a work of selection. . . .To proceed by elimination --to know how to discard, as the gambler says, that is the great technique of selection. And here again we find the search for the One out of the Many to which we referred in our second lesson.[2]

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[1] Herbert Brün, "Teaching the Function of Time in Art," Manuscript, 1952, p. 1, in the collection of professor Mark Sullivan, Michigan State University.

[2] Igor Stravinsky, *Poetics of Music*, trans. Authur Knodol and Ingolf Dahl (Cambridge: Harvard University Press, 1947), p. 69.

The concept implies that by making decisions about what to choose and what to discard, the artist creates order out of chaos. As a result, the role of chance is supposed to be reduced or eliminated in the process of creating order.

When this concept is applied to music, musical composition can be regarded as the result of the composer's effort to create order in the acoustical world.

> The composer has to create, by choosing, an order in a medium that coincides neither with the order offered by the medium anyway nor with the orders that have already been created by other composers.[3]

> The process of musical composition can be characterized as involving a series of choice of musical elements from an essentially limitless variety of musical raw materials.[4]

The views outlined and the concept they articulate imply that sound needs to retain traces of human intention to become music, that is, traces of a composer's deliberate choice in the process of composing. In contrast, a chance event has been regarded as an event which happens randomly, and thus bears no trace of human intention.[5] If one takes these views into account in relation to controversy about chance and the nature of composition, they represent a distinct position: a musical piece cannot be purely the result of chance.

However, no matter what the historical continuity of the term art may have been, there is music that has been called "chance music," for the last twenty years, by both composers and the public. The contradictory implications of the term, "chance music," thrive on confusion about the

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[3] Mark Sullivan, "The Performance of Gesture: Musical Gesture, Then and Now" (DMA dissertation, University of Illinois, at Urbana Champaign, 1984), p. 15.

[4] Lejaren Hiller, *Experimental Music* (Westport: Greenwood Press Publishers, 1979), p. 1.

[5] Steven M. Cahn, "Chance," in *Encyclopedia of Philosophy*, ed. Paul Edwards, 8 vols. (New York: The Macmillan Company & The Free Press, 1967), vol. 2, p. 73.

role of chance in musical composition. The confusion is often aggravated by the way some composers describe their compositional ideas and their music. Unless the confusion is eliminated, the term chance music will continue to function as an "abortive concept" in discourse about music.[6]

The premises chosen here to dispel the confusion are two: first, music cannot be purely the result of chance; second, chance can be used to generate material or contexts that allow a composer to escape the constraints of a habitual repertory, but only to the extent that chance provides something, no matter how minimally, that can bear traces of a composer's intention, of the composer's choices. Examining the way concepts of chance have influenced thought in other fields--physics, philosophy and the visual arts--provides a general context for examining the specific and distinct ways these concepts have been used in music, particularly by contemporary composers who have been concerned with chance operations. Several works that relate to chance operations will be examined in order to show differences in the way concepts of chance have been related to the process of composition by composers. This examination

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[6] Heinz-Klaus Metzger, "Abortive Concepts in the Theory and Criticism of Music" *Die Reihe*, 5:21. Metzger says, " 'Where there are no ideas, some word always takes their place at the appropriate time': this saying from 'Faust' has become, in German, not just a familiar idea but a proverb. But even though it is not accepted philosophical or even philological terminology, it implies a distinction between idea (concept) and word, defining a word as 'verbiage" (to use the journalistic jargon whose ideas in the field of musical criticism I wish to criticise). If an idea or concept is a word which grasps a subject, then a mere word, which does not grasp a subject, is an abortive concept. The frequent occurrence of such words in music criticism results from a lack of concepts, and even musical theory that claims to be serious rarely rejects them--more often it hastens to appropriate them, unless it has already invented its own. 'Vital,' 'motoric,' 'elemental,' 'statement,' 'engineers' art,' 'pointillist,' 'aleatoric,' 'musical splitting of the atom,' 'sincerely felt,' 'electron music,' 'competent,' 'alchemists' kitchen,' 'the twelve-tone,' 'rhythmic,' 'atonal,' 'human,' 'serial,' 'experimental': these need analysing.

Some of these words have a rational meaning, if they are regarded as vehicles for concepts, not as substitutes for them; others, such as the 'innate musicality' one often reads about, are merely badges advertising irrationality, with no reference to anything concrete at all; they function simply as labels worn on the backside, so that like minds without a single thought can recognise one another."

will show how changes in the concept of composition have transformed the character of performance.

Many composers have addressed the subject of the relationship between chance and music. Their statements and their compositions will be investigated, particularly those of Iannis Xenakis and John Cage. The investigation will show how their compositional ideas correspond to, or contradict, their musical practice, and how compositions can establish a consistency that bears a composer's intention, even under the influence of chance operations. The contradictions and consistencies found reveal the dilemma that composers face in relating chance to the composition of music, but also reveal why the role of chance came to be thought important by contemporary composers. More importantly, the contradictions and the consistencies created reveal both the limits and the potential chance operations have brought to the art of composition.

CHAPTER I

CONCERN WITH CHANCE AND INDETERMINACY IN SCIENCE AND THE ARTS

Shifting from the notion that the world could eventually be explained in terms of cause and effect relationships, philosophy, modern physics, and art have become concerned with the explanatory power of theories based on chance. Existentialism is one movement in philosophy that is based on the premise that chance is an important dynamic in reality. In opposition to the supposition of an ordered world, existentialists have emphasized the illogical, uncertain character of the universe. They resist efforts to construct philosophical systems that "attempt to understand individual existence within a conceptual scheme of a kind that would exhibit a logically necessary connection between every individual part and the conceptual scheme of the whole universe."[7] In contrast to such systems, existentialists maintain that there is no rational pattern discernible in the universe. In their philosophical and literary works, they deal with the question of how to live in a universe without a rational pattern while resisting the temptation to revert to comforting fictions that deny the dynamic of chance.

In modern physics, there was a remarkable change in the perception and the description of the phenomena of the physical world. Newton's action-reaction mechanics suggested a mechanical universe in which

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[7] Alasdair MacIntyre, "Existentialism," in *Encyclopedia of Philosophy*, vol. 3, p. 147.

every effect had a cause and every cause an effect. Writing during the shift away from Newtonian thought, physicist Max Born realized the importance of the concept of chance in physics. He said:

> I think chance is a more fundamental conception than causality: for whether in a concrete case a cause-effect relation holds or not, can only be judged by applying the laws of chance to the observations.[8]

The development of quantum mechanics in the twentieth century spurred an attack on the importance of strict causality in explaining the nature of physical reality, an attack that undermined the assumption that all events are causally determined and can be scientifically observed and predicted.[9] Quantum physicists claim that certain events at the subatomic level are unpredictable either because they are uncaused or because the causes of these events are too complex for people to observe. Therefore, in quantum mechanics, the description of subatomic particles cannot be based on the observation of a single particle, because individual subatomic events are all isolated events, which either have no causal connection, or which have causes that are too complex to be knowable. Instead, quantum physicists observe such particles *collectively,* and this manner of observation requires that they use the principles of averages, statistics, and probability.

The theory of probability was first applied in science by Carl Gauss in his theory of experimental errors.[10] Gauss' theory is based on the notion that no scientific experiment and observation is likely to be absolutely correct, and no two measurements are likely to produce exactly the same

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[8] Max Born, *Natural Philosophy of Cause and Chance* (New York: Dover Publications, 1964), p. 47.

[9] Cahn, p. 73.

[10] Born, p. 46.

result. Consequently, this theory proposes that the best way for the experimenter to determine the most accurate measurement is by making a number of measurements, and then using the principles of statistics, averages and probability.

James Maxwell and Ludwig Boltzmann's kinetic theory of gases was also developed using concepts of statistics and probability. This theory was proposed in the nineteenth century, to account for the speed and movement of molecules in a gas. Based on the discovery that, in an enclosed space of constant temperature and pressure, the speed of molecules tends toward a mean distribution, this theory explains the mechanical and thermodynamic properties of gas as the average behavior of the molecules, not as the behavior of individual molecules.

The change in these philosophical and scientific ideas is reflected directly and indirectly in some contemporary composers' ideas and methods of composition. Iannis Xenakis is one of those composers. Interested in probability theory and the kinetic theory of gases, Xenakis attempted to apply what he learned from those theories to his composition. For instance, his interest in sound mass and the consequent de-emphasis of individual sounds, required him to use statistical procedures which show more concern with the collective characteristics of a musical event than with each individual sound within that event. Even more explicitly, Xenakis, in his composition, *Pithoprakta,* used random aggregates of pitches as an analogy in music to the behavior of a collection of molecules in a gas.[11]

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[11] Nouritza Matossian, *Xenakis* (New York: Taplinger Publishing Company, 1986), p. 92.

Some composers have developed methods of composition which are philosophically and methodologically related to modern movements in the visual arts. For instance, the action painting of Jackson Pollock, and the mobile sculpture of Alexander Calder considerably influenced Earle Brown's compositional ideas and methods. Inspired by spontaneity and mobility in works by these two artists, Brown has tried to reflect these ideas in his music. He says:

> Spontaneous decisions in the performance of a work and the possibility of the composed elements being "mobile" have been of primary interest to me.[12]

Unlike traditional sculpture which has a fixed form, Calder's mobiles consist of several parts which move in space, changing their relationships with one another from moment to moment. In spite of its mobile structure, Calder's sculpture does not lose its identity as a single work because of the limited relationships among its parts. Inspired by the mobile forms of a single work, Brown applied Calder's mobile concept to his music by creating open-form compositions, in which the score consists of several composed parts that are to be arranged in various ways by the performer.

Available Forms II is an example of an "open-form" composition. This work is composed for two orchestras, which are to play simultaneously. The score for each orchestra consists of four pages. Each page contains either four or five musical events, each of which differs from the other events in its sound characteristics: articulation, density, contour, timbre or registration. In order to perform this work, the conductors, working independently of one another, choose one combination of the given

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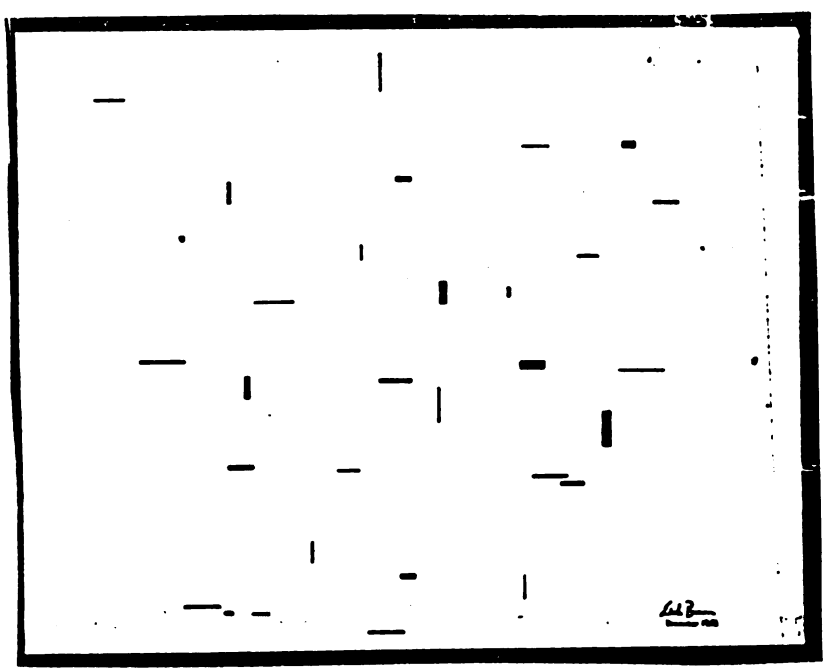
[12] Earle Brown, "Introductory Remarks," in *Available Forms II* (New York: Associated Music Publishers, 1965), p. 1.

events. The individual musical events are rehearsed, but the performance cannot be. The composer spoke of this piece:

> The title of the work refers to the availability of many possible forms which these composed elements may assume, spontaneously directed by the conductors in the process of performing the work.[13]

Brown's graphic scores also resulted from his desire to create his music in such a way that it can be spontaneously realized by the performer on the basis of graphic cues given by the composer. *December 1952* is well known for its wholly graphic score. Lines and rectangles of various lengths and thicknesses replace traditional musical notes (Ex. 1). The lines and

Ex. 1. The Score of Earle Brown's *December 1952*.



rectangles may be read as implying direction, loudness, duration, and pitch. The performer chooses how to read the sonic implications of the graphic signs.

Brown, together with Christian Wolff, Morton Feldman, and David Tudor, has been closely associated with John Cage since the early fifties.

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[13] Ibid.

He believed that Cage's music was both philosophically and methodologically related to the art of Calder and Pollock. Brown said of Cage: "John was the first musical mind I'd met that reflected the feelings I'd gotten from the work of Calder and Pollock--and those were more important to me than any musical influences I've ever known."[14] In fact, Cage's music is, in some ways, related to the arts of action painters.

Jackson Pollock, a leading figure in action painting, stresses "the supremacy of the act of painting," and originated the term, "action painting."[15] As opposed to intellectual and formalistic principles, action painters are primarily concerned with their "spontaneous" actions. Many times, Pollock created his paintings by pouring or dripping paint onto the canvas in a spontaneous manner. He said:

> When I am in my painting, I am not aware of what I'm doing. It is only after a sort of "get acquainted" period that I see what I have been about. . . . the painting has a life of its own, I try to let it come through.[16]

The paint he gets on the canvas in this way is a result of his spontaneous actions which in themselves are considered an important part of painting.

Like action painters, Cage emphasizes the importance of spontaneity in music. He said, ". . . form unvitalized by spontaneity brings about the death of all the other elements of the work."[17] Both action painters and Cage regard the process, painting or composing, to be more important than the final result. This emphasis on process leads Cage to assert that it is necessary to accept whatever comes from the process of what he still calls composition, regardless of the result. In addition to this, there is a

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[14] Quoted in Herbert Russcol, *The Liberation of Sound* (New Jersey: Prentice-Hall, 1972), p. 144.

[15] Bryan Robertson, *Jackson Pollock* (New York: Harry N. Abrams, 1960), p. 36.

[16] Quoted in Robertson, p. 194.

[17] John Cage, *Silence* (Middletown: Wesleyan University Press, 1961), p. 35.

similarity between Cage's concept of art's relation to life, and that of action painters. As Harold Rosenberg indicated, action painters tried to break down every distinction between art and life. To them, the very act of painting is the end, not the means, of their art, and the object of their art is the mere record of that act which is inseparable from the life of the artist.[18] Similarly, Cage maintains that there is no "split" between art and life.[19] In his compositions, *4'33"*, for instance, he intended to make people notice the diversity and beauty of sounds occurring in their everyday life.

Increasing concern with the experience of everyday life is also shown in the works of Robert Rauschenberg, who is one of the most important American painters of the post-abstract expressionist era. His most unusual paintings are all-white paintings. They are pure white canvases with nothing painted on them. He intended with these paintings to make spectators participate in what is happening in their everyday life: "One could look at them and almost see how many people were in the room by the shadow cast or what time of day it was."[20]

Concerning the notion of art, Rauschenberg is in line with Cage. Opposed to the traditional notion that the prime function of art is to produce order out of chaos, Rauschenberg says: "As for me, I consider myself successful only when I do something that resembles the lack of order I sense."[21] This statement exactly reflects what Cage answered to a question about the purpose of writing music: ". . . an affirmation of life--not an

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[18] Harold Rosenberg, "The American Action Painters," *Art News* 51 (December 1952): 23.

[19] Cage, *Silence*, p. 14.

[20] Quoted in Calvin Tomkins, *The Bride and the Bachelors: the Heretical Courtship in Modern Art* (London: Weidenfeld and Nicolson, 1965), p. 203.

[21] Quoted in Tomkins, p. 199.

attempt to bring order out of chaos nor to suggest improvements in creation, but simply a way of waking up to the very life we're living."[22]

Rauschenberg was not particularly interested in the effects of chance in art. But he tried to reduce the degree of control over his art in order to make it free from his personal aesthetic taste.

> I don't want a painting to be just an expression of my personality. . . . I don't believe in chance any more than I believe in anything else. . . with me it's much more a matter of just accepting whatever happens, accepting all these elements from the outside and then trying to work with them in a sort of free collaboration.[23]

Rauschenberg's expression "accepting whatever happens" echoes Cage's view of the role of the composer. Cage stated that, "accepting whatever comes, regardless of the results,"[24] was a way to get rid of the constraints individual taste places on the creation of music.

In line with Cage and Rauschenberg, Marcel Duchamp, a twentieth-century artist who was deeply involved in the chance-oriented movement in art, was strongly concerned with exploring the possibilities of creating art from the objects in his immediate surroundings. He used ready-mades--ordinary manufactured objects such as a bicycle wheel and a bottle rack--the materials for his art. These objects are then taken out of the context of their normal usage. They do not represent anything other than themselves in his art. In this respect, Duchamp's way of dealing with the ready-mades is similar to the way that Cage wants to use sounds in his music.

> Each sound has its own spirit, its own life and we cannot pretend to repeat that life. It can never become the example of a life, an example for another life. What is true for sounds, applies equally to men. And that is exactly why men are not sounds, nor are sounds

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[22] Cage, *Silence*, p. 12.

[23] Quoted in Tomkins, p. 204, p. 231.

[24] Cage, *Silence*, p. 130.

men. Musicians spend their time forgetting that. My pedagogy is that we must not forget that any more.[25]

Disassociation of the object from its expected context was also attempted by surrealists, although they were not primarily interested in eliminating the role of personal aesthetic taste in the decision making process of composition. Rather they wanted to challenge the general appearance of reality and get away from it. Their first step was to break down and disintegrate what seemed to be reality, but actually, they thought, was not.[26] Challenging fixed ways of looking at things and their relationships, surrealists juxtaposed seemingly unrelated elements in a single work in order to thwart expected relationships and to create other possible relationships. They stressed the need to consider all possibilities, and insisted that all restraints and taboos must be tested in order to transcend socially imposed, repressive, patterns of thinking.

In music, composers of musique concrète challenged assumptions of both composers and the public about the kinds of sound that were suitable material for musical composition. The name originated from the materials used. The composers of this music use "concrète" sounds which could be found in our environment, including traditional instrumental sounds. In the view of Pierre Schaeffer, who is regarded as an originator of this music, composers of traditional music begin with abstract ideas that become concrete only in performance. The composers of this new music start with concrete material that is made abstract during experimentation and composition.[27] Listening to musique concrète, people can experience

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[25] John Cage, *For the Birds* (Boston: Marron Boyars, 1981), p. 90.

[26] Tom Hibbard, "Freedom by Chance: Dada and Surrealism," *Midwest Quarterly --A Journal of Contemporary Thought* 28 (1987): 369.

[27] Quoted in Barry Schrader, *Introduction to Electro-Acoustic Music* (New Jersey: Prentice-Hall, 1982), p. 11.

how much complexity and diversity can be created out of a simple sound source whose musical potential has been ignored because of its familiarity in our everyday life. In this way, this music tried to provide people with a new way to hear sounds, free from their prejudices against the sounds in everyday life.

Using procedures like those of surrealist painters, Karlheinz Stockhausen separated elements from their logical context to generate the material of *Gesang der Jünglinge.* In this work, concrete and electronic sound sources are combined. The Apocryphal chapters of Daniel in the Bible were used as the text of this work. The composer, however, disassociated the words from their context by reordering them. In addition to this, some individual words are divided into syllables or phonemes, and those divided elements are rearranged, occasionally with the insertion of electronic sounds. Sometimes electronic sounds are generated in a way that allows them to simulate linguistic elements. For instance, vowels are represented by sine tones, and consonants by noise bands.

Unlike surrealists, Stockhausen was not primarily concerned with destroying the expected logical connection between elements. He only planned various degrees of textual comprehensibility based on strategies of control derived from information theory.[28] Nevertheless, the work, whether the composer intended it or not, challenges fixed notions about the logical connection between the linguistic elements of a text, and the logical connection between linguistic elements and the musical elements. It demonstrated new possibilities: speech sounds could be treated as pure sound, electronic sounds could be close to speech sounds; linguistic

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[28] David Ernst, *The Evolution of Electronic Music* (New York: Schirmer books, 1977), p. 89.

elements could become musical elements: and diverse new meanings could be created from an original text, by reordering the sounds and words in that text.

The concepts of chance that influenced modern thought in science and the arts also spurred artists and composers to attempt new ways of painting and composing. Many artists began to work with processes that changed the kind of control and determination which was exercised in the act of creation. In the world of art, interest in objects and sounds found in everyday life and used as artistic materials grew, and materials and methods which had been exploited over and over again seemed less and less able to satisfy the creator's artistic desire to produce work of originality and complexity. In this historical situation, composers were not alone when, in their search for new materials and methods for their art, they began to explore the potential, and encounter the problems, of chance relationships in composition.

CHAPTER II

A CHANGE IN THE DEGREE OF DETERMINACY AND CHANCE MUSIC

No matter how precisely the composer defines all aspects of a composition, he cannot totally avoid unintended results. Chance always has a role both in composing and in performance. The attempt to analyse and control the role of chance in music resulted in part from some contemporary composers' responses to their observations of the inherent element of chance in composing and performance. It also resulted from the frustration which followed the observation that multi-serialized orders were so complexly ordered that they were perceived as indistinguishable from chance generated events.

Pierre Boulez responded to this frustration by trying to "absorb" rather than eliminate chance, by "taming" it with the composer's choice.

> . . . despairingly chance persists, slips in through a thousand unstopable loopholes. And it's fine that way! Nevertheless, wouldn't the composer's ultimate ruse be to absorb this chance? Why not tame these potentialities and force them to render an account, to account for hemselves?[29]

To absorb elements of chance in the process of composition in no way means that the composition becomes merely the result of chance, a result which completely excludes the composer's intention. Instead, the composer decides to incorporate unintended sounds, i.e., sounds occurring as a result of chance, into his music in the process of composing, or in the

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[29] Pierre Boulez, "Alea," *Perspectives of New Music* 3 (1964): 45.

process of performance. Boulez clearly differentiated chance sounds from a musical composition when he said, "I am interested as to what chance sounds occur on the street, but I will never take them as a musical composition."[30]

In addition to the decision to incorporate chance sounds in the composition, there are other ways by which the composer can intentionally let the elements be selected by chance during the process of composing. In one case, he can select and organize sounds by so-called chance operations. The use of the computer, statistical theory, and the I-Ching are examples of such operations. Unlike traditional ways of determining materials, chance operations allow the composer to be relatively detached from the conditioning of taste in the selection of material, and thus provide more possibilities for the composer's choice. In another case, the composer leaves all, or some of the musical material to be determined by the performer.

In this respect, the term chance music can be understood to refer to three distinct cases: music in which chance sounds are deliberately incorporated into a composed framework or piece by the composer; music in which the original sound material is selected and organized by means of chance operations; music which is wholly or partially left to the determination of the performer. As a result, in chance music, there is a low degree of determinacy concerning the selection and the organization of acoustical material. In this respect, the resultant indeterminacy does not refer to something which has no determining factors--something undetermined--but something which is *not determined by the composer.*

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[30] Quoted in David Cope, *New Directions in Music,* 3rd ed. (Iowa: Wm, C. Brown Company Publishers, 1981), p. 237.

In the process of composition, the composer decides what to determine and how to determine it. In relation to these two decisions, the term indeterminacy in music can be used in the following cases: when what the composer decides not to determine--for instance, the selection of the sound material for a certain section or the whole music--is left to the determination of the performer or the environment; when what he decides to determine--pitches, durations, dynamics, for instance--is determined by means of chance operations; or both cases. Chance operations have to do with ways of creating and shaping musical materials. Indeterminacy is a conjecture about the nature of the determinations that bear on the music which is partially, or completely, created by some set of operations.

In fact there is no music which does not have some degree of indeterminacy, because it has been impossible for a composer to perfectly determine all aspects of his composition. Electronic music is often put forth as an exception to this statement. It has been regarded as music in which every aspect of sound and every event in the composition is perfectly defined and also perfectly realized as defined, since electronic music is stored on a tape, eliminating further human interpretation. But strictly speaking, even in electronic music, something which is different from the composer's determination, can be introduced both in the process of composition and in its reproduction. For example, unintended noises may be added to the composition, resulting from the inferior state of the equipment, or from the composer's lack of knowledge about how to deal with the equipment. The composed sounds may be distorted in the process of reproduction, resulting from the environmental or acoustical situation of the concert hall, or the inferior state of reproducing machines.

From this point of view, neither the term "indeterminate music," frequently used synonymously with chance music, nor the term "chance music" itself should be understood as terms which refer to music that is distinguished from music which is determinate. What marks chance music and actually distinguishes it from its historical predecessors, is a distinct change in the degree of determinacy, that is, a low degree of determinacy intended by the composer in the process of composition. Therefore chance music, like any other music, can be put on a spectrum of relative degrees of determinacy

A low degree of determinacy involved in the process of composition, can change the character of the realization of a piece. For instance, the composer only provides several separate events which are to be arranged by the performer. In some cases, the performer is asked to spontaneously decide what to play or how to play at the very moment of the performance. Even the realization of traditional music differs from performance to performance both in trivial and significant ways. However the degree of intended variability of the realization is relatively low in most traditional music.

The investigation of several musical examples will show how composers introduce differnt kinds and degrees of determinacy in creating their compositions, and how the music created in such a way can change the character of performance. Cage says that in *Music of Changes* he used the I-Ching in order to determine duration, tempo and dynamics. However the results obtained from the I-Ching are presented so that no aspect of the results is allowed to be determined by the performer. Therefore the function of the performer in this case is the same as that of those who play traditional music. The composer speaks of this piece:

> Though chance operations brought about the determinations of the composition, these operations are not available in its performance. The function of the performer in the case of the *Music of Changes* is that of a contractor who, following an architect's blueprint, constructs a building. That the *Music of Changes* was composed by means of chance operations identifies the composer with no matter what eventuality. But that its notation is in all respects determinate does not permit the performer any such identification. . . .[31]

Xenakis uses probability theories and statistics to determine the microscopic details in some of his compositions, *Pithoprakta,* for instance. In this piece, the composer allowed elements of chance to occur only in the process of composing, and, as in Cage's *Music of Changes*, the results obtained from this process are notated without allowing the performer to change what is defined by the composer.

In contrast to this kind of composition, there are some compositions in which several notated events are provided by the composer but their arrangement is left to the determination of the performer. Stockhausen's *Klavierstück XI* is an example. This work contains nineteen events which are notated in a traditional way. The arrangement of these events, however, is not determined until the performer decides on it prior to the performance. Brown's *Available Forms I* and *II* are intended to be performed in the same way, except that in this piece the conductor is asked to spontaneously decide the order of the events at the very moment of performing. As the title suggests, each performance is meant to be one of the available realizations of the piece.

There are some compositions the scores of which only suggest the performance either by some visual signs other than traditional musical notes, or by verbal instructions. Most graphic score pieces are the

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[31] Cage, *Silence,* p. 36.

examples of the former and Cage's *4'33"* is an example of the latter. In both cases, there is a considerably low degree of determinacy in the process of composition and a high degree of variability of its realization.

Christian Wolff's *Duo for Pianists, II* has no score. There is only an indication for a broad limitation such as the use of pianos with no silences between performer responses. The beginning and the ending of this piece are determined by the situation under which performance takes place. The score for *Variations II* by Cage consists of eleven sheets which are to be randomly superimposed by the performer. The composer provided the instructions for creating a score and for realizing the score. There are many ways of creating a score for this piece, and many more ways of realizing it once it is created.

The application of concepts of chance to musical composition has brought about changes in the ways composers desire to control the musical material in their compositions. The introduction of new concepts of determinacy, controversy about how to achieve the desired degree of determinacy, and controversy about the desirability of the degree of determinacy achieved mark an often contentious, but crucial, dialogue that is itself an outgrowth of general tendencies in the compositional activity of the last thirty years. These tendencies both overlap with, and diverge from, one another, but the thought and works of Iannis Xenakis and John Cage provide two windows through which the central outlines of this situation can be observed and evaluated.

CHAPTER III

THE ROLE OF CHANCE IN IANNIS XENAKIS' STOCHASTIC MUSIC

Iannis Xenakis is a contemporary composer who made concepts of chance important in music. He composed music based on these concepts, which by then had already come to dominate many aspects of contemporary mathematics and science. Xenakis does not conceive the relation between chance and determinacy as a relationship between two opposite poles which negate each other. Instead his view allows chance to be conceived within a spectrum of relative degrees of determinacy.

> Since antiquity the concepts of chance, disorder, and disorganization were considered as the opposite and negation of reason, order, and organization. It is only recently that knowledge has been able to penetrate chance and has discovered how to separate its degrees--in other words to rationalize it progressively, without, however, succeeding in a definitive and total explanation of the problem of "pure chance."[32]

The spectrum of relationships between chance and determinacy has already been considered in fields other than music.

> It has been a philosophical and mathematical commonplace since the Port Royal Logic in 1662 and Bernouilli in 1713 that there is no absolute polarity between chance and determinism [*sic*]; that there is, rather, a continuous spectrum between pure chance at one end and pure determinism [*sic*] at the other; that both pure states are rare; and that it is, moreover, possible to argue with as rigorous a logic, with as extended a mathematics and with as fruitful results at the chance end of the spectrum as at the deterministic end.[33]

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[32] Iannis Xenakis, *Formalized Music* (Bloomington: Indiana University, 1971), p. 4.

[33] Christopher Butchers, "The Random Arts: Xenakis, Mathematics and Music" *Tempo* 85 (Summer 1968): 2.

Xenakis defines chance as "an extreme case of controlled disorder."[34] To him, chance occurs in the world of probability. It is "controlled" because the scope of the events is defined by the probabilities. It is a "disorder" because there is no causal relationship between events in the world of probability. In other words, on the microscopic level of individual events, events occur in a non-causal way, but from the macroscopic world's point of view, they occur within a limit. Thus, Xenakis maintains, chance needs to be calculated by means of the laws of probability.[35]

Xenakis applied this concept of chance, viewed as the relationship between microscopic and macroscopic levels, to music. He thought that the composer's role could be to define the macroscopic shape of a composition in which each microscopic detail could be left to the determination of chance, and developed a compositional method that allowed him to determine the large scale, statistical characteristics of musical events without specifying, first or at all, the nature of musical detail.

> Most frequently musicians start with a detail, . . . But as soon as you broach entirely new structures and begin to work on them, you can't even try to begin with this or that, and then develop it, because such a process would lead you nowhere. You must on the contrary find a way of looking at, of feeling things of reasoning that is entirely new, and the first thing to do is to establish an overall view of the work, and afterwards to choose your material working at its elements one against another, conjointly or independently, until it becomes organized, vital.[36]

Historically, the impulse to develop this method was, in large part, a response to what Xenakis saw as the impasse reached by maximally serialized music.

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[34] Xenakis, *Formalized Music,* p. 25.

[35] Ibid., pp. 38-39.

[36] Quoted in Max Bois, *The Man and His Music : A Conversation with the Composer and a Description of His Works* (London: Boosey & Hawkes, 1967), p. 13.

> After a lag of some decades, atonal music broke up the tonal function and opened up a new path parallel to that of the physical sciences, but at the same time constricted by the virtually absolute determinism [*sic*] of serial music. . . . As a result of the impasse in serial music, as well as other causes, I originated in 1954 a music constructed from the principle of indeterminism [*sic*]; two years later I named it "Stochastic Music." The laws of the calculus of probabilities entered composition through musical necessity.[37]

The impasse he refers to has to do with the problem of serial complexity in a polyphonic context: when every strand in a polyphonic context bears the weight of several serialized parameters--dynamics, timbre, and duration, as well as pitch and rhythm--the autonomy of separate voices is undermined. In short, the listener cannot follow lines. Xenakis called this predicament "auditory and ideological nonsense." He continued:

> . . . under these circumstances. . . Linear polyphony destroys itself by its very complexity; what one hears is in reality nothing but a mass of notes in various registers. The enormous complexity prevents the audience from following the intertwining of the lines and has as its macroscopic effect an irrational and fortuitous dispersion of sounds over the whole extent of the sonic spectrum. There is consequently a contradiction between the polyphonic linear system and the heard result, which is surface or mass.[38]

The desire to create complex multi-serialized parts and the desire to preserve a polyphonic linear system brought about a contradiction in the acoustic results that was observed by many listeners and composers. Paul Griffiths presents this problem as a conflict between the order created by the composer and the order perceived by the listener.[39] He argues that although every element of sound is carefully ordered, i.e., serialized, by the composer, the listener can hardly perceive that order. Under these circumstances it seems likely that the listeners would pay attention to the order that is perceivable, what Xenakis calls "surface or mass."

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[37] Xenakis, *Formalized Music*, p. 4, p. 8.

[38] Quoted in Xenakis, *Formalized Music*, p. 8.

[39] Paul Griffiths, "Xenakis: Logic and Disorder," *Musical Times* 66 (1975): p. 329.

Other people have tried to discuss this dilemma in terms of the relationship between microscopic and macroscopic order.[40] George Rochberg said:

> With all attention and energy focused on a self-enclosed microcosmic [*sic*] order it becomes *impossible* to shape the external architecture of music; under such conditions the end product can only be true *formlessness macrocosmic* [*sic*] *indeterminacy* (Italics mine).[41]

The term "macrocosmic indeterminacy," is, however, misleading. From a logical point of view, it implies that there is nothing which determines the macroscopic shape, as if it just occurred, but even when the macroscopic shape is not determined directly by the composer, it is still determined by the pre-set orders of microscopic materials. It is not "undetermined" but rather "indirectly determined" or "unintentionally determined." Moreover, it is hardly "impossible" for the composer of serial music to plan both the microscopic details and the macroscopic shape. All he need do is carefully manipulate the serial orders and apply them to small and large scale events. Rochberg's understanding of the technique of total serialism is either superficial, and erroneous from a theoretical point of view, or he confuses the shortcomings of specific implementations of a concept with the potential of the concept.

Furthermore the term "formlessness" is even more inappropriate. No doubt, the composition of totally serialized music cannot be reconciled with traditional ways of composing, and its formal construction in many ways cannot be, or is not, identical to the formal construction of traditional music. But neither of these conditions means that there is no form.

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[40] Although Rochberg used the terms "microcosmic" and "macrocosmic," I think "microscopic" and " macroscopic" are more appropriate in this case, and used them in my discussion.

[41] George Rochberg, "Indeterminacy in the New Music," *Score* 26 (January-June 1960), p. 17.

Xenakis responded to the dilemma of serial music from the listener's perceptual point of view. He observed that what the listener hears is the "surface" or "mass" of a totality created by each of the isolated sounds. As a result Xenakis became concerned with sound mass and de-emphasized the importance of the individual sound. He reasoned that, under conditions of such complexity, a slight change in an individual sound within an event would not make a perceptible difference to the listener. According to him, what the listener perceives is the collective characteristics of an event generated by the statistical interaction of each sound within that event, not the characteristics of isolated sounds. Xenakis supported this observation with a comparison to natural sonic events.

> . . . natural events such as the collision of hail or rain with hard surfaces, or the song of cicadas in a summer field. These sonic events are made out of thousands of isolated sounds; this multitude of sounds, seen as a totality, is a new sonic event. This mass event is articulated and forms a plastic mold of time, which itself follows aleatory and stochastic laws.[42]

Karlheinz Stockhausen made a similar analogy between natural phenomena and statistical composition. Speaking of the characteristics of a composition, he said:

> You can exchange the position of elements within given limits at random and it doesn't change the characteristics. Like changing the position of the tree's leaves. You can say: "This is a beech tree." even if all the leaves have changed their position.[43]

Both Stockhausen and Xenakis are interested in general configurations in which the individual component is not as important as its relative contribution to the whole, in other words, configurations or aggregates in which the whole is characterized, not its parts. In this

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[42] Xenakis, *Formalized Music,* p. 9.

[43] Quoted in Jonathan Cott, *Stockhausen: Conversations with the Composer* (New York: Simon and Schuster, 1973), p. 74.

respect, both composers are in line with many developments in modern science. In order to get more valid and comprehensive scientific knowledge, science often pursues the general characteristics of entities on a macroscopic plane, rather than considering the precise properties of the micro-components of those entities. The knowledge of general properties is a statistical knowledge.

The general properties of acoustical materials can be considered statistically. For instance, a voiceless consonant's waves have "a statistical, chance distribution" within a higher and lower frequency limit. If one perceives a sound going up or down, becoming thinner, thicker, brighter, or darker, it is due to a change in statistical "tendency." For these reasons, Stockhausen defines the statistical procedure of a composition as "a random distribution of elements within given limits."[44]

Any kind of music can be analyzed from a statistical point of view: Stockhausen, for example, analyzed the statistical characteristics of Debussy's *Jeux* and *La Mer*--average densities, sound masses, upward or downward motions, etc. Although Debussy and other composers did not mathematically calculate the statistical characteristics of their music, they have been always concerned with such characteristics, especially on the macroscopic level, and have planned and controlled them in other ways.

Xenakis uses probability theory to define the average description of sound by which a particular musical event can be characterized. In order to characterize statistically the pattern of an event, one needs an average to which variations and deviations from the norm can be compared. The application of the concept of averages to musical composition can be seen

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[44] Quoted in Cott, p. 73.

as a challenge to the values held by composers who strive for the uniqueness of each detail in composition. To Xenakis, however, this statistical method provides the means to control the macroscopic shape of a composition under conditions that prevent either the emergence of the importance of detail or the emergence of certain kinds of complexity.

> . . . when linear combinations and their polyphonic superpositions no longer operate, what will count will be the statistical mean of isolated states and of transformation of sonic components at a given moment. The macroscopic effect could then be controlled by the mean of the movements of elements which we select. The result is the introduction of the notion of probability, which implies, in this particular case, combinatory calculus.[45]

By using probability theory, Xenakis can control the role of chance in his composition. Once the macroscopic structure of a composition is made by the composer, each detail of that structure is worked out through the application of procedures governed by mathematical theories of probability. The composer calculates averages of states of relationships between musical elements, and also their deviations and variations. It is in the process of selecting those deviations and variations that chance enters. The composer can choose these variations randomly because deviations and variations are probabilistically calculated beforehand in relation to averages, and, as a result, any deviation chosen has already been prevented from changing the general characteristics of an event.

Pithoprakta

An investigation of *Pithoprakta* will show how Xenakis applied probability theory and what he learned from the kinetic theory of gases, to

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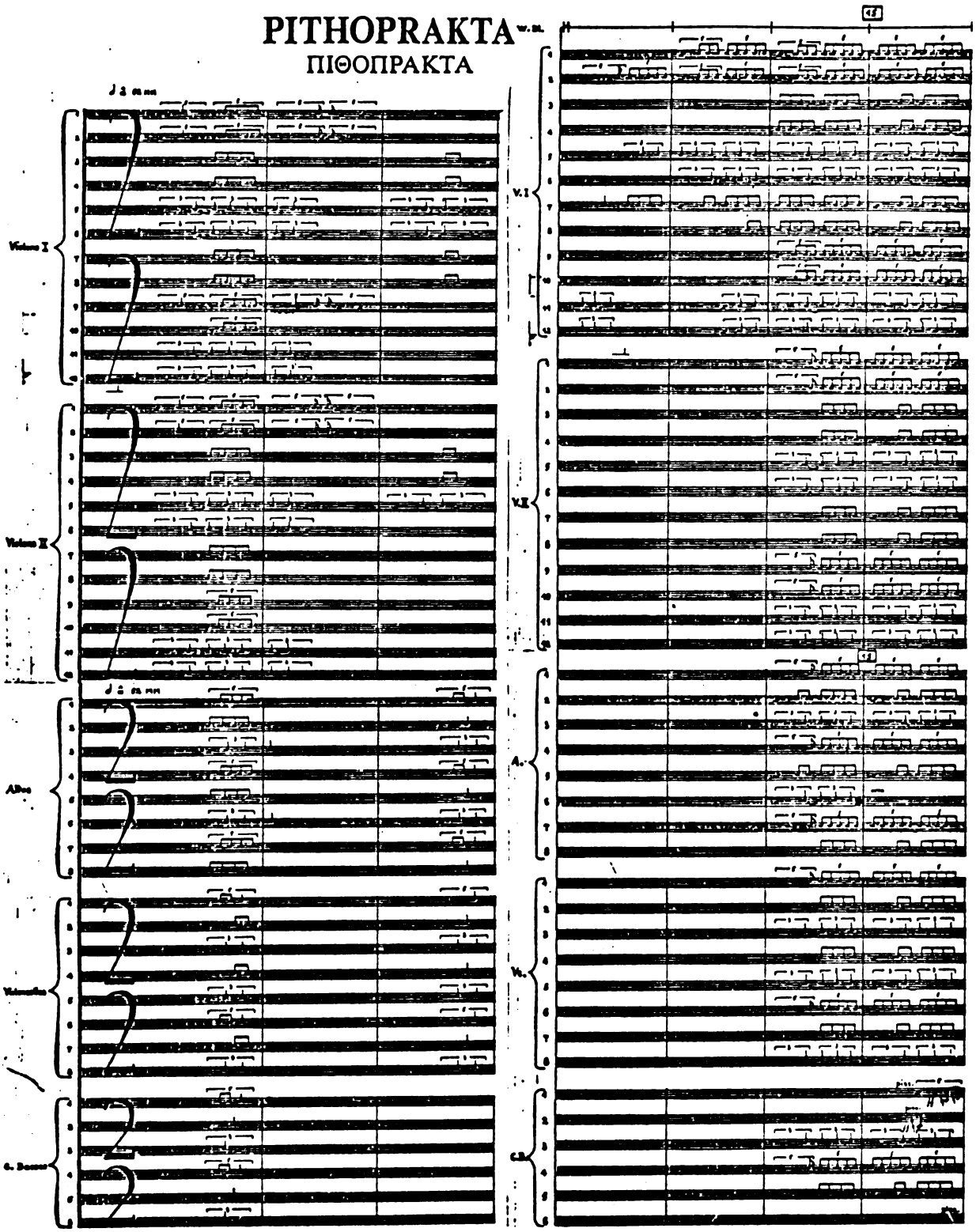
[45] Xenakis, *Formalized Music*, p. 8.

composing. The literal meaning of the title *Pithoprakta* is "actions by means of probabilities. This work is scored for 50 instruments: 46 strings, 2 trombones, 1 xylophone and 1 woodblock. The work is divided into four sections separated by silence. Each section is subdivided. What primarily distinguishes each section is its timbral and textural characteristics. The opening section begins with soft tappings on the back of the string instruments. After the first attacks by all string players in the first measure, the tappings are sparsely scattered to individual players or groups of individual players until all players resume the tappings (measure 14 in Ex. 2). After this measure, more and more pitched sounds, bowed or plucked, gradually replace the tappings of various unspecified pitches, and eventually entirely displace them (by measure 45 in Ex. 3). These pitched sounds end with an abrupt silence, then the second section starts (measure 51 in Ex. 3).

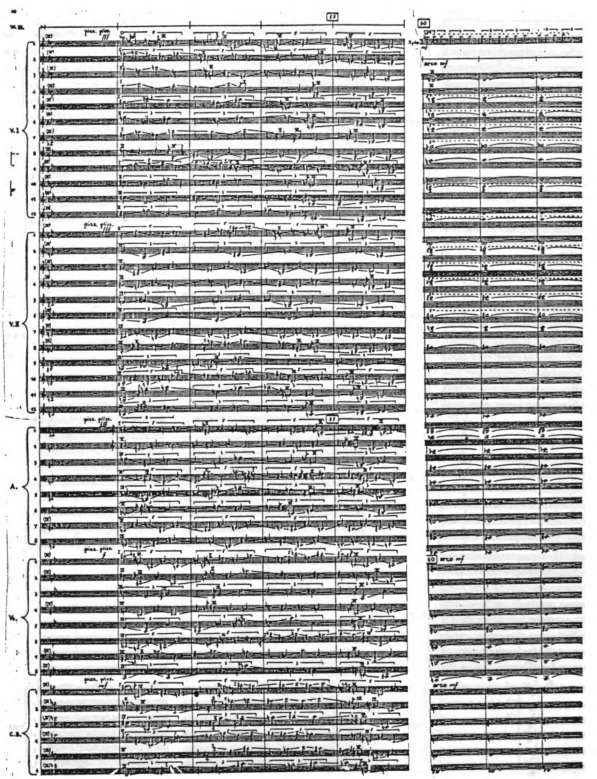
The timbre of the second section is characterized by glissandi, pizzicati, and sustained multi-note clusters. First, pizzicato-glissandi are predominant (measures 52-59 in Ex. 4). From measure 60 through 74 each string player holds a different pitch in a vast cluster with no internal emphasis while the xylophone marks time by repeating a single pitch, A (Ex. 4). Against these sustained bowed clusters which give a quiet, static background effect, a duet is introduced: a duet between a repeated A on the xylophone and a repeated pizzicato F on a violin, which later moves to other pitches and is joined by other stringed instruments (Ex. 5). Following this duet, a large proportion of the sustained pitches change, one by one, to pizzicati and glissandi. In measure 105, sustained pitches disappear completely (Ex. 5). From measure 109 to 120 (Ex. 6), string instruments play in pairs: one instrument plays a pizzicato while its partner bows the

Ex. 2. Iannis Xenakis, *Pithoprakta*, Measures 1-3 and 12-15.

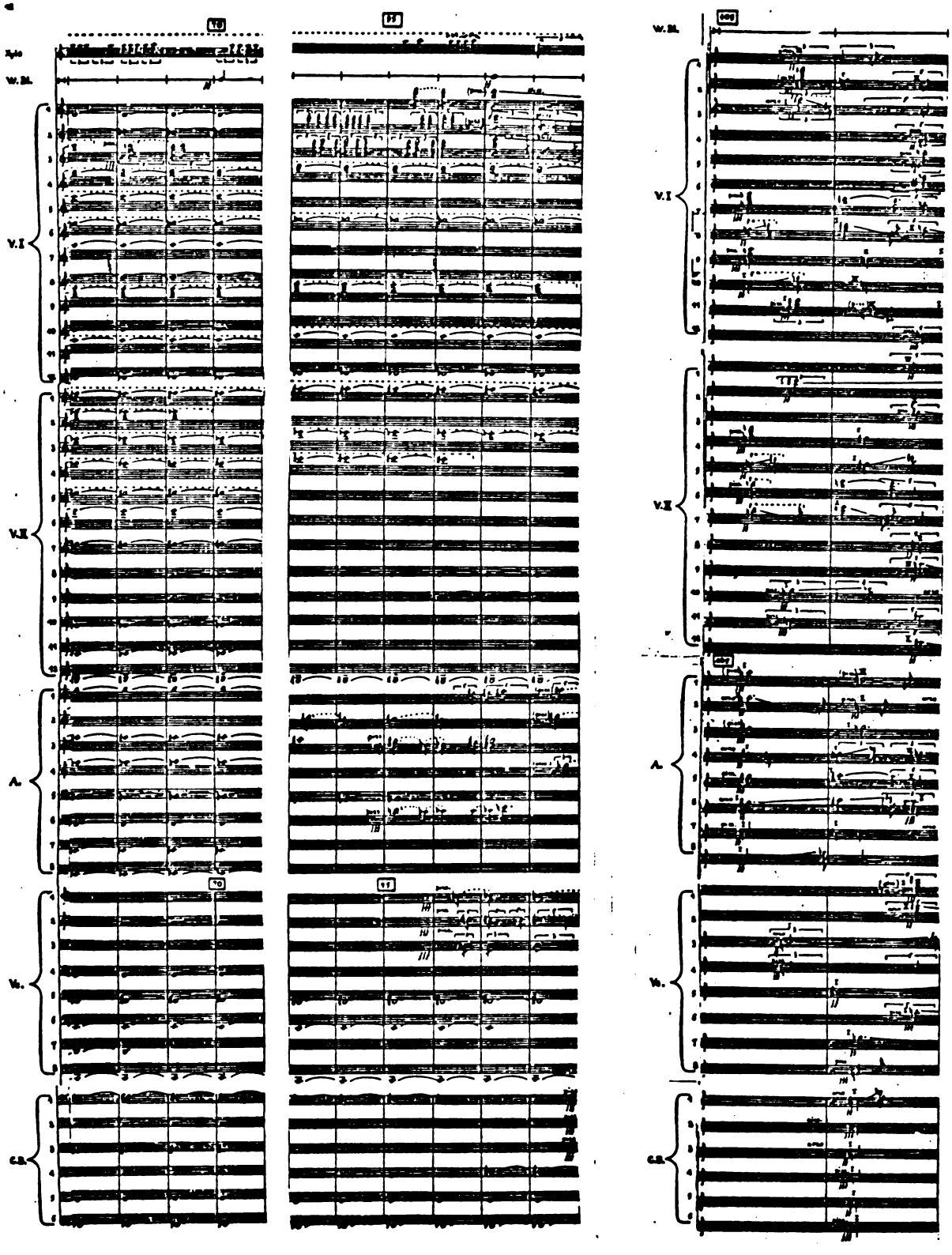


Ex. 3. *Pithoprakta,* Measures 34-36 and 43-46.

Ex. 4. *Pithoprakta,* Measures 51-55 and 60-62.



Ex. 5. *Pithoprakta,* Measures 67-70, 93-98, and 105-106.

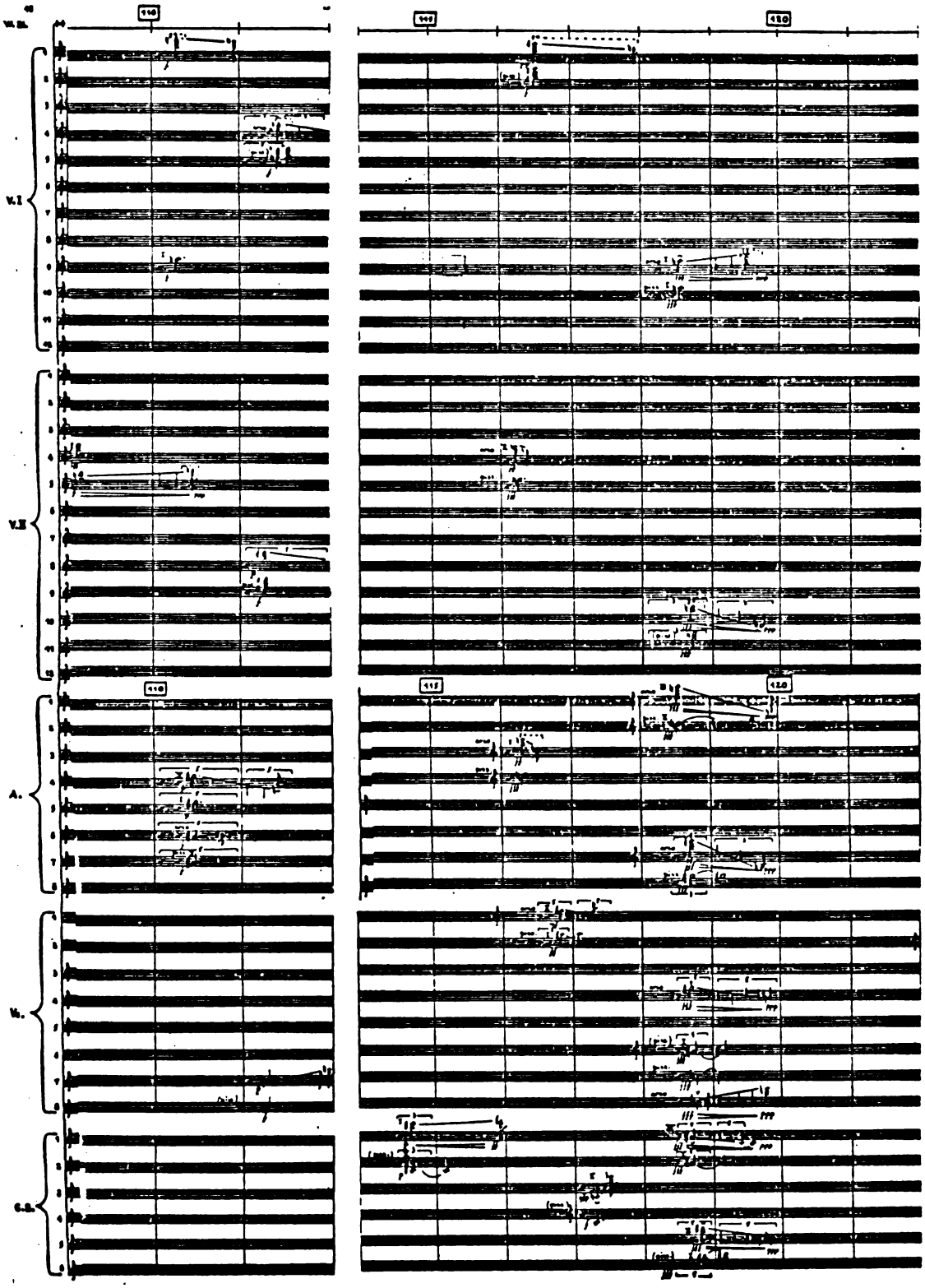


same pitch and then ascends or descends with glissandi.

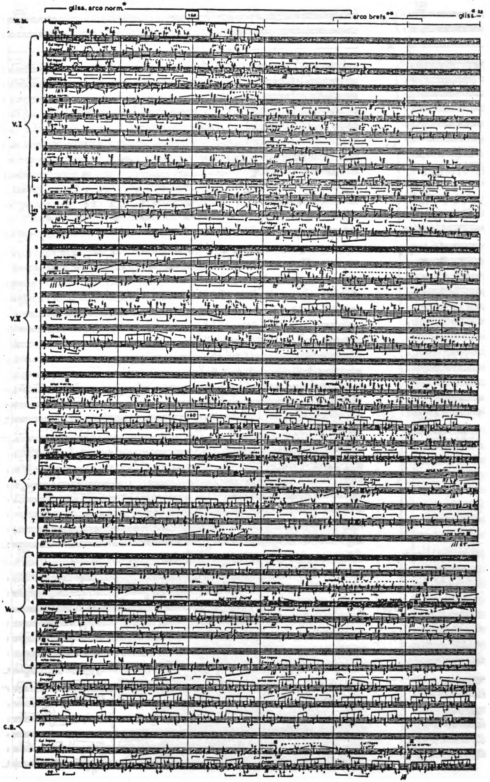
After a two-measure silence, the third section starts. This section consists of the most heterogeneous timbre in the work. All methods of sound production--*col legno frappe, arco bref, arco normal*, pizzicato, glissando, etc.--other than the initial tappings are used here. None of these articulations dominate the others and none of them stand out individually (Ex. 7). Rhythmic activity is high and the density is thick. It is in this section that the trombones make their only appearance (measures 172-83 in Ex. 8). They enter on a unison G. One trombone holds it for those twelve measures, while the other moves on a glissando from G and then returns to the unison. The quiet (*ppp*), static sounds of the trombones are contrasted with those of the string ensemble which is loud (*fff*) and rhythmically active (Ex. 8). This chaotic string sound suddenly changes to pizzicati in measure 180 (Ex. 8). The density is getting thinner, the activity is getting slower, and then silence follows. After the alternation of attack and silence twice, each string group repeatedly plays a set of musical figures. Fragments of these figures continue to be played and then the last section starts in measure 208 (Ex. 9).

The last section resembles the second section in that it is again based on glissandi of various types that lead to multi-note sustained clusters (Ex. 10), but this time, the activity does not last as long as it did in its first appearance. The whole work ends on a single high harmonic played by all violins, repeated, under changing durations, but without change of pitch or dynamic level (Ex. 11).

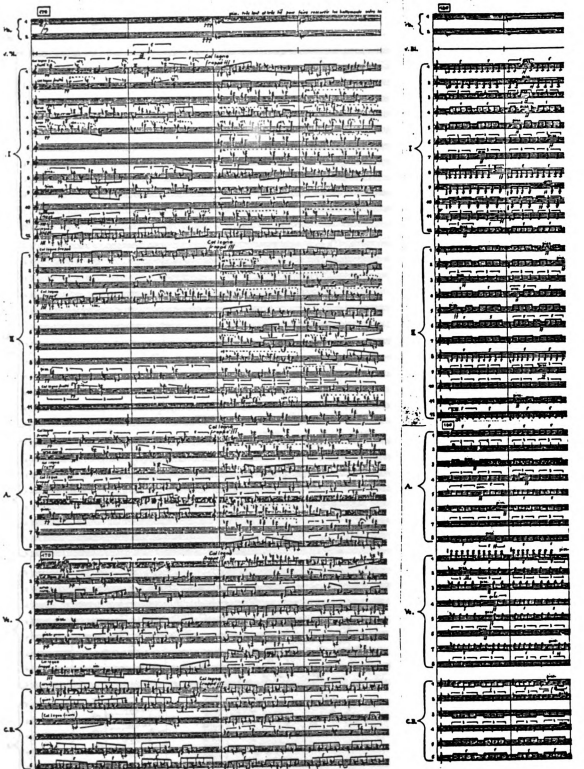
Ex. 6. *Pithoprakta*, Measures 109-111 and 114-121.



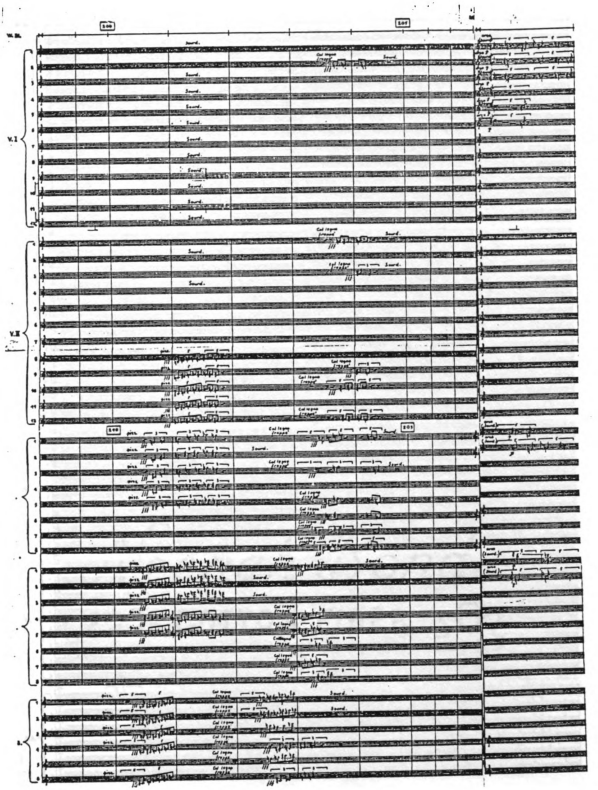
Ex. 7. *Pithoprakta,* Measures 158-163.



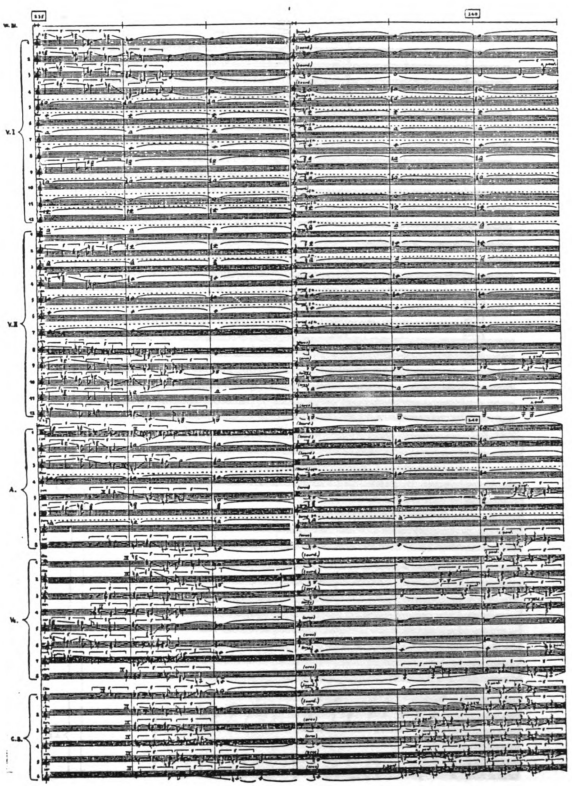
Ex. 8. *Pithoprakta,* Measures 170-173 and 180-181.



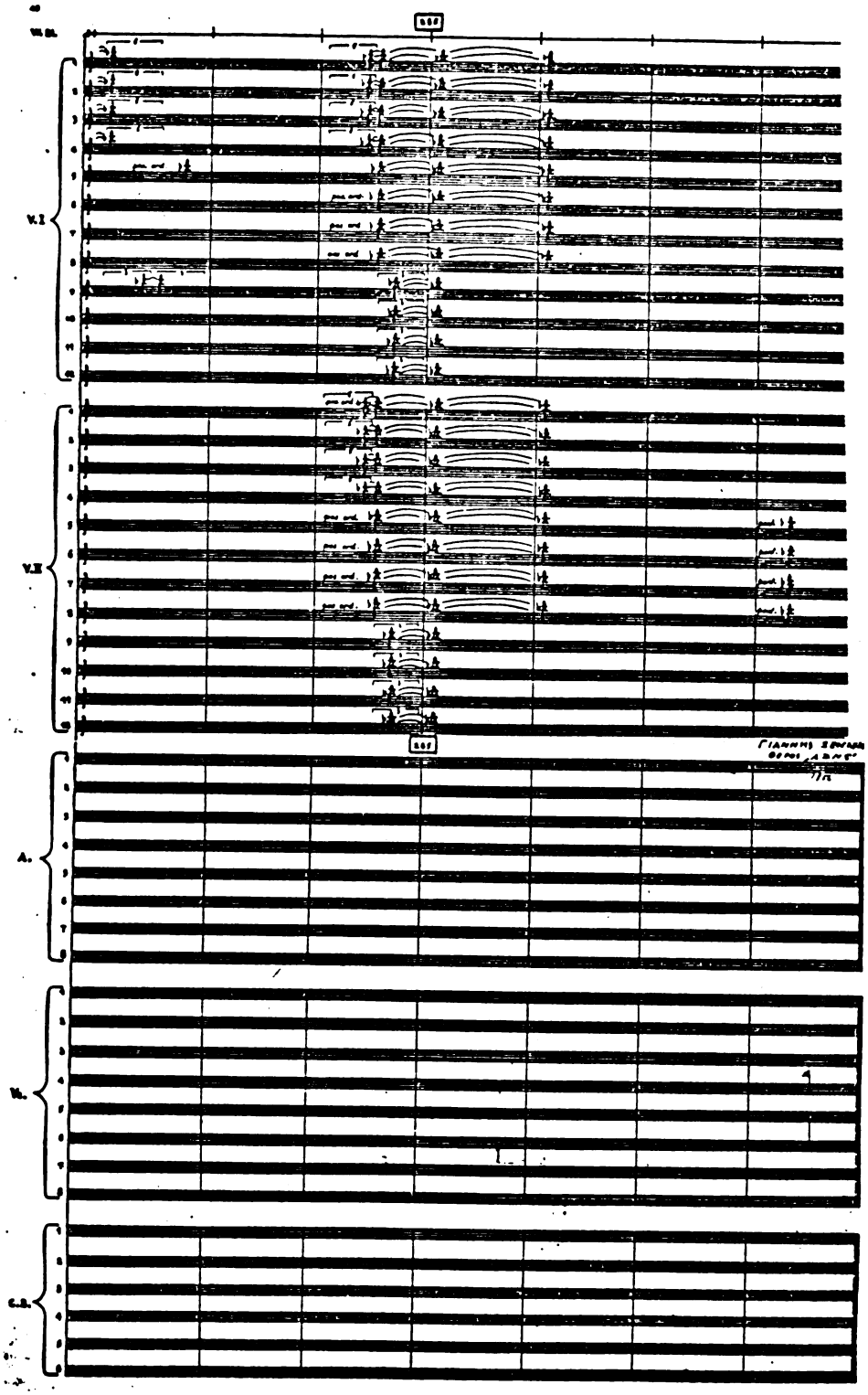
Ex. 9. *Pithoprakta,* Measures 198-208.



Ex. 10. *Pithoprakta,* Measures 235-240.



Ex. 11. *Pithoprakta,* Measures 262-268.



As seen in the above investigation, each section of *Pithoprakta* is characterized and distinguished from the others by large scale contrasts between different sonic events, for instance, the contrast between glissandi and pizzicati in the second section. Individual components of sound lose importance in favor of collective characteristics. If glissandi move within average ranges of pitch space, then which pitches, which contours, and which dynamics are involved in those glissandi is relatively unimportant. Individual pitches can be randomly generated by the computer, by a mathematical formula, or by another method. When the methods outlined above are used, microscopic details are not determined until the composer gets the result from the computer or mathematical formula; they are not preconceived by the composer. However the composer may have to make adjustments when the result, converted into musical elements, is not appropriate, for instance, when the pitch delivered is higher than the range of a certain instrument. In this way, the overall sonic result is controlled by the composer.

In a sense, Xenakis has reversed the normal procedure of composing: instead of building his material from separately described units, he has refined it from a general mass of randomly generated sounds, which he then limits. He has controlled his material by mathematical calculation, rather than by the traditional means of placing tones.[46] In this piece, Xenakis used these statistical methods to create an analogy between the movement of gas-molecules and the movement of pitches. How this analogy is realized will be examined in some detail.

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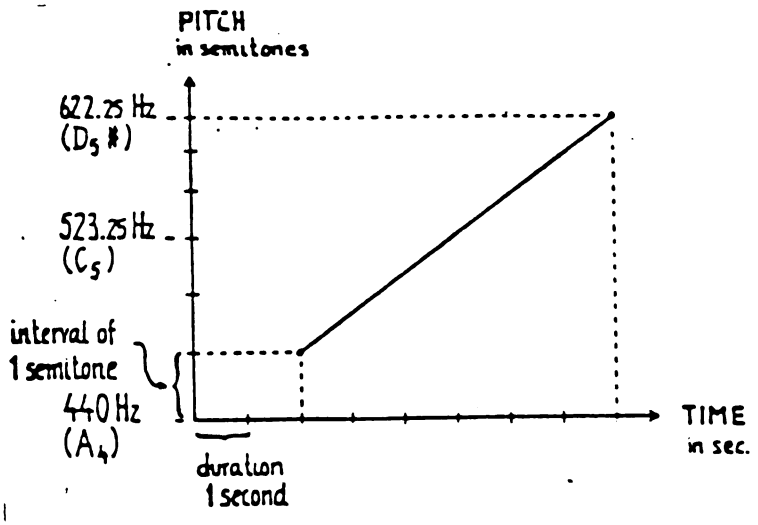
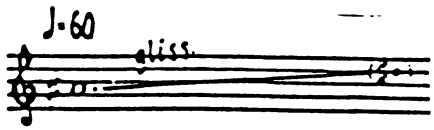
[46] Norman Kay, "First Performances," *Tempo* 78 (1966): 23.

A simple sound has two principal co-ordinates: pitch and position in time (Ex. 12). If the x axis is taken as time and the y axis as distance, the speed can be calculated as y/x. The speeds of gas molecules can be represented in the analogy by the continuous variation of pitch from the lower A to the higher D in the form of the glissando (Ex. 13).

Ex. 12. A continuous change in pitch, A to D as plotted on a pitch-time graph.



Ex. 13. The graph in Ex. 12 is converted in the form of the glissando.



Xenakis included the relationship between the temperatures and the pressures of a gas, in the analogy by shaping the musical elements of duration, density, intensity, and timbre. In a gas, a probability distribution of speeds of molecules can be calculated in an enclosed space of constant

temperature and pressure, so Xenakis created a musical situation in which durations, density, intensity, and timbre are kept constant so that he can calculate a probability distribution of glissandi analogous to the probability distribution of speeds.

Xenakis uses stochastic methods to make musical transformations. Unlike traditional music in which transformations were made mostly by means of development or variation, in Xenakis' music, transformations are made by changing the statistical distribution of musical materials. and the statistical character of events. By gradually replacing average distributions with deviations, he can make continuous transformations which produce a gradual changes. In addition to this, rather explosive transformations can be made, when sudden and drastic deviations from the average destroy the stability and cohesiveness of the average, or when the average description of events is brought together with events that are highly improbable.

Although Iannis Xenakis, like John Cage, turned to the creation of events that have some characteristics of randomness, he did not shrink the act of choosing to nothing, in order to preserve their randomness. Instead Xenakis made his choices in a new way and preserved the random characteristics, but only within the limits he created and chose. John Cage, on the contrary, although he also made choices in a new way, decided to explore the limits of the act of choosing, and not the choice of limits.

CHAPTER IV

JOHN CAGE: HIS PHILOSOPHIES IN RELATION TO COMPOSITION

Cage's idea of music and art has been, as he himself admitted, considerably influenced by his understanding of Zen Buddhism: ". . . without my engagement with Zen I doubt whether I would have done what I have done"[47] Zen Buddhism stresses maintaining a spirit free from human intention, taste, and effort. It is a kind of spiritual discipline for "full enlightenment" in the Buddhist sense.[48] Applying these notions to composition, Cage insists that composers should remove their intentions from composing so that their taste and emotion do not perturb their "tranquility."[49] Influenced by Suzuki's teaching, he thinks that human emotions, linked to the ego, prevent us from communicating with the outside world, to other people. Emotions only make us remain within ourselves, confined in our narrow views. Cage sees nothing wrong in "feeling" emotions, but, he says, one should not keep or reinforce them because they can produce a "critical situation in which all of society is now entrapped [*sic*]."[50]

> Emotions, like all tastes and memory, are too closely linked to the self, to the ego. The emotions show that we are touched within ourselves, . . . We have made the ego into a wall and the wall doesn't even have a door through which the interior and exterior could communicate! Suzuki taught me to destroy that wall . . . , the

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[47] Quoted in Michael Nyman, *Experimental Music* (London: Cassell and Collier Macmillan Publishers, 1974), p. 43.

[48] Ninian Smart, "Zen," in *Encyclopedia of Philosophy*, vol. 8, p. 367.

[49] Cage, *For the Birds*, p. 56.

[50] Ibid.

> wall has to be demolished; tastes, memory and emotions have to be weakened; . . . , I am willing to have emotions, but without being a slave to them.[51]

Christian Wolff, a composer who supports Cage's thought, echoes this idea of removing the composer's intention. He views music as "a resultant existing simply in the sounds," free from expressions of self or personality.[52] Wolff thinks that the final goal for composers is to be free from artistry and personal aesthetic taste so that music does not serve psychological, literary, or pictorial purposes.

In his writings and statements, Cage maintains that the composers' mission is to imitate nature in its manner of operations, which he believes is chaotic and non-causal. Cage thinks that strict notions of causality have resulted from the use of human reason--the faculty that interprets things logically and imposes causal relationships on things. In this context, the function of art and artists, he says, is "to preserve us from all the logical minimizations that we are tempted to apply to the flux of events."[53] He opposes the notion of cause and effect in which each cause has a given effect. Instead Cage thinks that there is a multitude of causes and effects, and that their interrelationships are so complex that everything causes everything else.

> So that when one says that there is no cause and effect, what is meant is that there are an incalculable infinity of cause and effects, that in fact each and everything in all of time and space is related to each and every other thing in all of time and space.[54]

Using similar reasoning, Cage refutes the one-to-one correspondence generally accepted in any kind of symbolism: a relationship in which a

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[51] Ibid.

[52] Quoted in Cage, *Silence*, p. 68.

[53] Ibid., pp. 80-81.

[54] Ibid., p. 47.

particular thing is a symbol of another particular thing. He says "If each thing in the world can be seen as a symbol of every other thing in the world, then I would like it."[55]

This notion that all things are related resembles many kinds of transcendental ideas which emphasize ultimate unity as the true reality beyond the seeming diversity of the physical world. However, Cage's idea about the relationship between people and nature is primarily based on the teachings of Zen which emphasizes the harmonious relationship between people and nature. Cage relates this view to what he sees as the deep-rooted philosophical differences in the attitude of oriental people toward nature and that of occidental people: the difference between oriental philosophies which, he thinks, emphasize the acceptance of nature and occidental philosophies which, he thinks, emphasize a struggle against nature.[56]

Cage attempted to imitate what he understood to be the chaotic, non-causal way of nature's operation not only in his music but also in his lectures and writings. His intention was to present his thought in his work, no matter whether music, writing, or lectures, in such a way that the listener could experience it, as it had unfolded. One example of such an attempt would be the texts of the lecture at the Eveny School of Pratt Institute in 1961. They were written to be heard as four simultaneous lectures. In the introductory statement to this lecture Cage says:

> I have therefore made a lecture in the course of which, by various means, meaning is not easy to come by even though lucidity has been my constant will-of-wisp. I have permitted myself to do this not out of disdain of you who are present. But out of regard for the way in which I understand nature operates. This view makes us all equals

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[55] John Cage, "Interview with Roger Reynolds," in *Contemporary Composers on Contemporary Music*, ed. Elliott Schwartz and Barney Childs (New York: Holt, Rinehart and Winston, 1967), p. 337.

[56] Cage, *Silence*, p. 73.

> --even if among us are some unfortunates; whether lame. blind, stupid, schizoid, or poverty-stricken. Here we are. Let us say "Yes." to our presence together in Chaos.[57]

Following his interpretation of oriental philosophies, Cage emphasizes "the acceptance of nature." By analogy, he views composition as an act of acceptance. In his opinion, the composers' responsibility is not to "make" an object, but to "accept " whatever comes, regardless of the results.[58]

> When a composer feels a responsibility to make, rather than accept, he eliminates from the area of possibility all those events that do not suggest the at that point in time vogue of profundity. For he takes himself seriously, wishes to be considered great, and he thereby diminishes his love and increases his fear and concern about that people will think.[59]

Cage's insistence on "acceptance" results from his view that music is a process, not an object, just as the world and our life are: "The world, the real is not an object. It is a process."[60] Accordingly, he thinks he need not be concerned with specific results because any result obtained from the process is just as valid to him as any other.

Cage's indifference to the specific results of composition reflects his desire to let sounds be themselves, free from man-made theories or expressions of human sentiment. He believes that the composer has to accept any sound and any relationship of sounds, giving up his intention to control the sounds. Drawing on these ideas, Cage criticized Edgar Varèse. Cage said he appreciated Varèse's contribution to the attempt to extend timbral possibilities by breaking down the traditional concept of noise and using it in compositions. However, from Cage's point of view, Varèse is

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[57] Ibid., p. 195.
[58] Ibid., p. 130.
[59] Ibid.
[60] Cage, *For the Birds*, p. 80.

still trying to "bend sounds to his will." He says, "We knew that he wouldn't let sounds be entirely free."[61]

Cage demands a complete break with the past, with traditional ways of composing. In this respect, he is critical of what he sees as the attempts of many European composers: the attempts to fuse and synthesize traditional ways of determining musical materials with chance operations. Referring to the attitudes of such composers as Stockhausen, Cage makes a sarcastic comment on the compromising attitude of these European composers: "It will not be easy for Europe to give up being Europe"[62]

Cage denies the necessity of organizing sounds in order to make any kind of continuity. Instead, he feels "the opposite necessity, to get rid of the glue so that sounds would be themselves."[63] Based on this notion, Cage comments that twelve-tone technique gives no more variety for pitch relations than does the tonal system, since twelve-tone technique provides another organizing system. As a positive counter example, he cites the composer Morton Feldman, who allows any pitch relationship in the belief that all pitch relationships are acceptable.[64]

John Cage explained the relationship between "continuity and no-continuity" in terms of acceptance: to him no-continuity simply means accepting any continuity that happens, whereas creating continuity to him means making a particular continuity that excludes all others. His emphasis on acceptance led Cage to deny the necessity of organizing sounds.

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[61] Ibid., p. 74.
[62] Cage, *Silence*, p. 75.
[63] Ibid., p. 71.
[64] Ibid., p. 133.

> I only keep that amount of organization that is useful for survival. That means that I assign organization that is useful for survival. That means that I assign organization to the place that it should have. Men generally act otherwise. They organize everything endlessly! And in particular useless things--music, for example.[65]

More and more, musical materials are selected or eliminated altogether by chance operations in Cage's latest periods of activity. With his increasing involvement with chance, he no longer feels the need to be concerned with structure, method, or even material. It leads him to a state of what Suzuki calls "non-obstruction." In a conversation with Roger Reynolds, Cage said, "I'm now more involved in *dis*organization and a state of mind which in Zen is called *no-mindedness.*"[66] Although Cage used the term "disorganization" for his compositional ideas and methods, the term should be understood as "non-organization," because he does not break up organized sounds, but simply abandons organizing sounds.

Cage regards silence as equally valid as sound in composition. He talks about silence as "the entirety of unintended sounds."[67] When Cage entered an anechoic chamber at Harvard, he observed that there was no such thing as pure silence. In that room, he heard two sounds, one high and one low: the former being his nervous system in operation and the latter being the circulation of the blood. He concluded, "Until I die, there will be sound."[68] Cage tried to demonstrate his position about silence in his work, *4'33"*. This work is frequently discussed as a "silent" piece. However "silent" in this case must be understood as unintended sounds, not as the general meaning of no sound at all. If listeners thought that the

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[65] Cage, *For the Birds.* p. 76.

[66] Quoted in Richard Kostelanetz, ed.,"Ur-Conversation with John Cage," *Perspectives of New Music* 25 (Summer 1987): 99.

[67] Cage, *For the Birds*, p. 41.

[68] Cage, *Silence*, p. 8. Cage describes that "an anechoic chamber is a room six walls of which are made of special material not to produce echoes, and to have as silent a situation as possible."

performance of *4'33"* was silent when, in fact, it was full of accidental sounds, Cage said:

> . . . they missed the point. You could hear the wind stirring outside during the first movement [in the premiere]. During the second, raindrops began pattering the roof, and during the third the people themselves made all kinds of interesting sounds as they talked or walked out.[69]

Cage explains chance in terms of "events which unfold at once or else successively without connection." He believes that "accepting chance like that, makes prejudices, pre-conceived ideas, and previous ideas of order and organization disappear."[70] As a result, Cage thinks it unnecessary for a composer to "put sounds together" which the very word "composing" literally means. He often uses the terms "music" and "composition" as if they are distict. However, he does not maintain the distinction consistently.[71]

Variations II

The investigation of *Variation II* will show how Cage attempted to apply his philosophies to his music, but also how the musical results can conflict with his philosophical positions.

The score materials of *Variations II* consist of eleven transparent plastic sheets: six have single straight lines on each sheet and the other five have single black dots on each. The score for the performance is completed by randomly superimposing several sheets. The performer can choose how many sheets to use, but in every chosen case there must be at

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[69] Quoted in Kostelanetz, "Ur-Conversation with John Cage," p. 97.

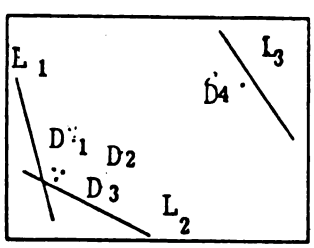
[70] Cage, *For the Birds*, pp. 45-46.

[71] "Schoenberg, whose student you were, said that you were not a composer, but an inventor of genius. What have you invented?" "Music, not composition." Cage, *For the Birds*, p. 15.

least one dot and one line. Frequency, amplitude, timbre, duration are determined by measuring the perpendiculars dropped from the dots to the lines on the superimposed surface. The measurement does not have to be mathematically exact. What is important for generating the score is the relations between the lines and the dots.

In order to discuss how to interpret the score, I will use samples from the sheets superimposed by Thomas DeLio to make his realization of the score.[72]

Ex. 14. The score of *Variations II* .
This one is created by superimposing three sheets which have single lines on each, and four sheets which have single dots on each.



The dots and the lines in example 14 are respectively labeled, D1, D2, D3 and D4; and L1, L2 and L3. Each line can represent any element of a sound: L1=duration, L2=pitch, and L3=volume, in this example. The relative distance from a dot to a line determines the quality of each element: for instance, if a dot is close to line L1, it represents a short duration; far away from L1, a long duration; close to L2, a low pitch; far away from L2, a high pitch; close to L3, a soft sound; far away from L3, a loud sound. In this example, D1 is a shorter, lower, and louder sound than D4. Therefore this configuration of the dots and the lines determines that there are three

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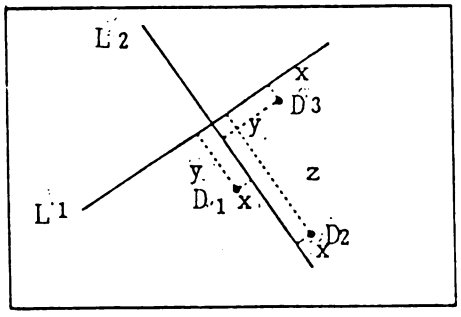
[72] Thomas Delio, *Circumscribing the Open Universe* (New York; University Press of America, 1984), p. 13.

times as many short sounds as long, three times as many low pitches as high, and three times as many loud sounds as soft.

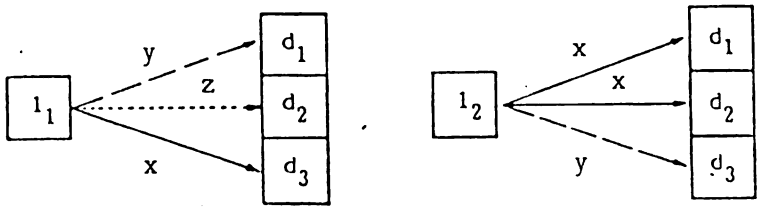
Example 15 shows a more complicated configuration.

Ex. 15. The score made of two lines and three dots.



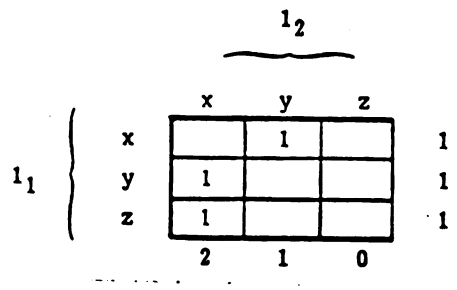
The number of all possible distances from dots to lines in the example above is equivalent to the number of elements in the cross product of D(dots) and L(lines): D1L1, D1L2, D2L1, D2L2, D3L1, and D3L2. When the measurements of the distances are approximately the same, they are regarded as equal distances: D1L2 and D3L1, and D1L1 and D3L2 in this case. Therefore there are 3 different distances, labeled x, y, and z from the shortest to the longest. If the solid line, the broken line, and the dotted line respectively represent the distances, x, y, and z (_____=x, -----=y, and .....=z), the charts in Ex. 16 show the distance distributions over line 1 and 2.

Ex. 16. The charts of the distance distributions over line 1 and 2.



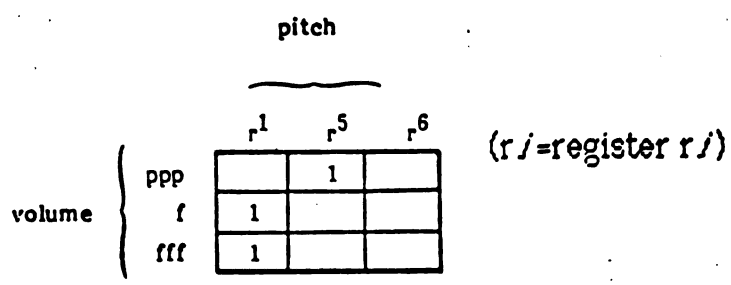
The following matrix in Ex. 17 results from the previous charts in Ex. 16.

Ex. 17. The matrix of the distance distributions in Ex. 16.



There can be several interpretations of this matrix. Interpretation, here, means the specific association of each line with an actual element of a sound and the association of each distance with the contents of a related element. For example, if one associates line 1 with volume and line 2 with pitch, the above matrix can be rewritten as in Ex. 18. The characteristic of the sonic event is statistically defined by this matrix.. There are two times

Ex. 18. An interpretation of the matrix in Ex. 17.



as many pitches in register 1 as there are in register 5, and there is an even distribution of the three dynamic levels. Several different realizations of the same configuration of lines and dots are allowed even within a single

performance.[73] However the distributions of the musical elements are already defined statistically.

By creating an experimental score for *Variations II,* Cage tries to realize his idea of indeterminacy in composition. In this work, neither the macroscopic shape nor the microscopic details are determined by the composer. He only presents the materials, six lines and five dots, which are to be used by the performer in order to generate the score. There are many ways of creating scores, and both the microscopic details and the macroscopic shape differ from score to score.

John Cage repeatedly stated that he wanted to keep his intentions out of the composition. In *Variation II,* obviously he has not totally excluded his intentions from the process of realization. He allows many different realizations of this piece, but those realizations are within the range of the possibilities latent in the materials given by the composer. *Variations II* is, then, "one large comprehensive system which represents the total accumulation of its many constituent realizations."[74]

Explaining strategies for emphasizing the process of creating music instead of the result, Cage made an analogy in which the composer would be like the maker of a camera "who allows someone else to take the picture."[75] In *Variation II,* Cage allows the performer to create the final piece. Instead of producing one particular finished object, he suggests the process by which every possible realization can be engendered.

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[73] "Any number of readings may be used to provide a program of any length." John Cage, "The Performance Instructions," in *Variations II* (New York: Henmar Press, 1961).

[74] DeLio, p. 25.

[75] John Cage, "Experimental Music," in *The American Composer Speaks* (Louisiana: Louisiana State University Press, 1966), p. 231.

In other writings, Cage stated that the purpose of writing music is not "an attempt to bring order out of chaos."[76] Yet the process suggested by Cage in *Variations II* is not consistent with his statement. The process of generating a realization of *Variation II* is a process of imposing order, of imposing restrictions in order to generate the final result. For instance, no matter what differences emerge in the process of creating a realization of the score, the distribution of the musical elements is statistically restricted by the configuration of the dots and the lines. Unlike the direct determination of statistical distributions made by Xenakis, the statistical distribution in *Variation II* was not planned by the composer. It is the result of a configuration made by randomly superimposed sheets. Yet the statistical distribution created is a result, no matter how minimally, determined by the composer's choices.

[76] Cage, *Silence*, p. 12.

CHAPTER V

THE LIMITS OF THE ROLE OF CHANCE IN MUSIC

John Cage has been frequently discussed in relation to chance music because of his controversial and contradictory statements about the relationship between chance and music. In his music, Cage is willing to include unintended sounds, unintended relations of sounds, so long as it results in sounds. He went as far as to claim that the composer should stop the act of choosing, and instead just accept any sound, any relations, regardless of the results.

However, many composers linked with and strongly influenced by Cage do not see the validity of Cage's insistence on the elimination of the composer's choice. They think that when the choice is completely eliminated, music is meaningless, because when there is no act of choosing, music does not exist and only mere sounds remain. Earle Brown, for instance, said:

> Mine is music by choice, not chance. My music enlarges the potential for musicians to take a more creative part in the music: yet I am not interested in everybody just doing his thing. I didn't compose by chance. I composed what I wanted to hear. . . . I'm not interested in non-control.[77]

Pierre Boulez has written about the relationship between composition and chance, and predictably, reached quite different conclusions from those advocated by Cage.

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[77] Quoted in Nyman, p. 145.

> Composing by chance is no composing at all. Composing. . . means to put things together. I am interested as to what chance sounds occur on the street, but I will never take them as a musical composition. There is a big difference between unorganized sounds and those placed within complete organization.[78]

In Boulez's opinion, chance sounds, by themselves, cannot be music until those sounds generated by chance are incorporated into a piece by a composer. His emphasis is not on the nature of chance sounds, but on the concept of composing which implies that traces of the composer's choice are what distinguishes music from mere sounds.

However Cage would object to Boulez's view, and, no doubt, deny the separation of music and sound as implied in the quotation below.

> This may seem to be far away from music, but I don't think it is. Here where I live you see no musical instruments. But it seems to me that we are surrounded by sound. What I'm hearing are the sounds of the traffic.[79]

In other statements, Cage contradicts the sense of his own remarks by saying: "To us any sound seemed capable of becoming musical by the simple fact that it was incorporated into a musical piece."[80] This statement implies that there is a difference between mere sound and music, and that in order for sound to become music, there must be somebody who incorporates that sound into a musical piece: that is, there must be, no matter how minimally, traces of a composer's intention.

Cage says that he can be free from intention if he accepts any sound when composing. His position amounts to the following statement: create music so that it can appear as if it were made without the composer, that is, as if it happened by chance, excluding any trace of the composer's

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[78] Quoted in Cope, p. 237.

[79] Ev. Grimes, "Conversations with American Composers," *Music Educator's Journal* 73 (November 1947): 48

[80] Cage, *For the Birds*, p. 74.

deliberateness. The dilemma revealed in this contradictory attitude, shows the limits of removing the composer's intention from the process of composition, and also the limits of the role of chance in music. To decide to accept any sound is an intention. Cage excludes the exclusion of any sound, and this is still an act of exclusion. Daniel Charles indicated this dilemma in his conversation with Cage: "The absence of a goal can become a goal. . . . Wanting disorder is still wanting."[81]

Another aspect of Cage's dilemma is revealed in the following statement in which he uses the word "intention."

> My intention was precisely to stop my music from going anywhere! I sought to let sounds go wherever they would go, and to let them be whatever they are.[82]

The only way to "let sound go wherever they go," is by doing nothing to them, and it logically leads to the negation of the composer, as Konrad Boehmer remarked: "If sounds are just sounds, even Cage is nowhere."[83] When the composer gives up the act of choosing, and instead just accepts any sound, which is the same as doing nothing, there is no difference between composing and any other activity. The composer no longer need write his name on his music as the author. The composer need not make scores, and he need not have performances.

> Art isn't camouflage, and if a work in any realization is indistinguishable from its peers or the prevailing landscape (a room or a field, without intention), it can't have anything to offer the consumer. Of course, a landscape may succeed brilliantly, but it needs neither help nor a title.[84]

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[81] Ibid., p. 54.

[82] Ibid., p. 86.

[83] Konrad Boehmer, "Aspects of Ideology in 20th Century Music," Manuscript, p. 9, in Proceedings of the Conference "The Shaping of Contemporary Musical Taste," presented by the University of Wisconsin-Milwaukee, School of Fine Arts, Department of Music, April 3-5, 1986.

[84] Roger Reynolds, "Indeterminacy: Some Considerations," *Perspectives of New Music* 4 (1965): 137.

In line with Cage, Morton Feldman asserts that "sound must exist in themselves, not as symbols, or memories which were memories of other music to begin with."[85] However, unlike Cage, Feldman allows himself to withdraw control only to that point which still allows the composer to preserve his identity in his composition. He says:

> The question continually on my mind all these years is: to what degree does one give up control, and still keep the last vestige where one can call the work one's own?[86]

In relation to this problem of the identity of the composer and his work, Earle Brown thought that even in open-form compositions there must be "a fixed sound-content, to establish the character of the work," just as somebody's identity is established by his or her basic characteristics, regardless of what they are doing or saying or how they are dressed.[87] Speaking of *Available Forms II,* he said: "While no two performances will arrive at the same formal result, the work will retain its identity from performance to performance through the unchanging basic character of the events."[88] What is important to Brown is finding the degree of conditioning which can balance the work between the points of control and non-control, not the complete elimination of control.

Feldman has also observed the dilemma in Cage's assertion of non-control in making music.

> It is not a question of a controlled or a de-controlled methodology. In both cases, it is a methodology. Something is being made. And to make something is to constrain it. I have found no answer to this dilemma.[89]

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[85] Morton Feldman, *Essays* (Beginner Press, 1985), p. 49.
[86] Ibid., p. 94.
[87] Quoted in Nyman, p. 58.
[88] Brown, "Introductory Remarks," p. 1.
[89] Feldman, *Essays* p. 114.

Feldman's philosophy of detachment from emotions and ideas in composition seems to be closely related to Cage's notion of the Zen spirit of "non-involvement," "will-lessness," and "non-obstruction." But Feldman denies any relationship between Zen and his music. To him, Zen is just another intellectual idea which is exactly what he wants to shun in his composing. Feldman thinks that music cannot be the medium for representing any ideas, that music must not be used as a vehicle for expressing something outside of the sound themselves.

This is an idea that is repeatedly emphasized in many of Cage's statements. However the musical results hardly correspond to the idea. For example, even *4'33"*, which he considers his best piece,[90] is a piece by which Cage intended to make people experience, not *sound,* but his *idea* that environmental sounds can be music.

> I have felt and hoped to have led other people to feel that the sounds of their environment constitute a music which is more interesting than the music which they would hear if they went into a concert hall.[91]

In addition to this contradiction, this piece shows the absurdity of Cage's insistence on the complete elimination of human intention in composition. There is a difference between when one does nothing and when he intends to have other people hear or just pay attention to all sounds occurring around him. However, in *4'33"*, Cage mistook the latter, which in fact is what he did, for the former. In the latter case, there is a minimal degree of human intention.

4'33" raises yet other questions related to Cage's emphasis on accepting, not making, sounds. Cage would accept whatever the performer

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[90] "I think perhaps my own best piece, at least the one I like the most, is the silent piece, *4' 33"*." quoted in Kostelanetz, "Ur-Conversation with John Cage," p. 97.

[91] Ibid.

does within 4'33". David Tudor performed this piece by closing and opening the keyboard cover for indicating the beginning and the ending of 3 sections. Cage must have been satisfied with this performance. But if a performer were to fill four minutes and thirty three seconds with traditional music, Cage still would have to accept it. In this case, however, the musical result would fail to realize his idea. Thus even this piece has limits that must be accepted if the idea behind its inception is to emerge.

Feldman also observed a problem with establishing limits in his pieces in which he used graphic notation. *Intersection No. 2* for piano solo is written on coordinate paper. The square taken horizontally represents a time-unit. For example, each box is equal to MM158 in the beginning. Vertically, each of three squares suggests relative pitch levels: High, middle and low. The number in a box tells how many keys to be played. The performer determines what particular pitches and rhythms to play. A conservative performer would make "familiar" type of sound and some "modernist" might make the less familiar.[92] Therefore what has been achieved is the liberation of the performer, rather than the liberation of sounds. Feldman says: "After several years of writing graphic music I began to discover its most important flaw. I was not only allowing the sounds to be free--I was also liberating the performer."[93]

Xenakis also observed this problem in open-form type compositions. Commenting on those composition, he pointed out two ways they fail: first, when the composer accepts any combination of the events as valid, he "resigns" his responsibility as a composer. In such a case, it is the performer who is promoted to the rank of composer by the composer

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[92] Henry Cowell, "Current Chronicle," *Musical Quarterly* 38 (January 1952): 131.

[93] Feldman, *Essays*, p. 38.

himself, and thus the result is a substitution of authors; second, in spite of the composer's desire to remove human taste from his music, the work, in performance, cannot be entirely free from human taste: that is, even if the composer could keep his habits and tastes out, the performers could not do the same.[94] Xenakis says that these two flaws are enormously aggravated in compositions that have graphic scores.

Cage said that by using the I-Ching, he managed to make *Music of Changes* free of individual taste. However, although the manipulation of materials may be free from taste, the selection of materials reflects his taste. Henry Cowell mentioned this problem.

> . . . Cage has not succeeded in eliminating his highly refined and individual taste from the music derived from the I-Ching. Unfortunately, from the point of view of this group of composers, no order of tossings can give anything more than a variety of arrangements of elements subjectively chosen to operate upon.[95]

Cage's attempt to be free from taste in his composition is of importance if he aimed to give himself more possibilities for compositional choice, not limited by the boundary of the composer's habit and preferences. However, he confused the liberation from taste with the elimination of his choice. Providing more possibilities in composition can only be considered in relation to the composer's choice. People cannot argue about possibilities in composition when the composer's choice is completely eliminated. The purpose of being free from the composer's taste and prejudice is to make a situation in which there are more possibilities for his or her choice.

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[94] I paraphrased the translation of Xenakis' words. The translated text reads: "1. The interpreter is a highly conditioned being, so that it is not possible to accept the thesis of unconditioned choice, of an interpreter acting like a roulette game; 2. The composer commits an act of resignation when he admits several possible and equivalent circuits." Xenakis, *Formalized Music*, p. 38.

[95] Cowell, p. 134.

Ironically, working with a computer may prove to be the best way to achieve what Cage wants: freedom from a repertory of taste and habit.

> . . . whereas the human mind, conscious of its conceived purpose, approaches even an artificial system with a selective attitude and so becomes aware of only the preconceived implications of the system, the computers would show the total of the available content. . . . The composer's choice from the computer's propositions would still remain a highly personal decision, but would be taken in a field which is not limited by the prejudicial boundaries of the choosing person's imagination.[96]

After the composer chooses one thing, there must be a way to compare it with other discarded possibilities in order for the chosen one to be meaningful. If there is no difference between a chosen one and the others, as when one accepts anything, to talk about the significance of choice is no longer meaningful.

> In order that his choice may be significant and the information carry a meaning, however, the relationship between the chosen and the eliminated possibilities must be perceived.[97]

Chance operations have been used to achieve the purpose of creating more possibilities from which the composer can choose. For instance, Xenakis used statistics and probability theory in his composition. Statistical calculation provides him more variety of material from which to choose, and, also allows him to choose the material randomly, not limited by his taste and habit, but only by the stipulated constraints which ensure that the intended musical event does not lose its collective characteristics. In this way, the consequences of chance are, as Xenakis intended, always calculated and controlled in his music.

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[96] Herbert Brün, "From Musical Ideas to Computers and Back," in *The Computer and Music*, ed., Harry B. Lincoln (Ithaca: Cornell University Press, 1970), p. 31, p. 34.

[97] Ibid., p. 29.

This shows that there is a limit to the role of chance in creating music. It can be used to allow a composer to generate materials or relations, free from the constraints of a repertory of taste and habit, but only to the extent that it does not totally exclude traces of a composer's intention. Cage believed that he could create music free of any traces of his deliberateness. However, his music does not support his philosophical position. He did not realize the limits of the relationship between chance and music: music cannot be purely the result of chance.

Conclusion

Many music critics, historians, and composers have used the terms chance and indeterminacy without distinguishing between the two concepts. Nevertheless, it is possible to extract from their discourse, distinctions that could provide the basis for consistent usage of these two terms. Indeterminacy generally refers to the characteristic quality of a process which ensures both that the determinations made by the composer remain relatively low in number, and which ensures that some aspects of the results will be unforeseeable, though not necessarily random, varying from performance to performance. Chance generally refers to the characteristic quality of a process which ensues that the results of its application will be consistently random, that is, they will have a fixed and determined degree of randomness. Chance is a consistent relationship, namely, that of a random consistency, and thus, can be consistently determined by the composer. Indeterminacy cannot be determined by the composer, but can only be the by-product of the composer's determinations.

John Cage has sought and created compositional processes which produce unforeseeable results and processes which produce determined degrees of randomness. He believed that if a composer did not aim at specific results in his composition, he could be free from the constraints of individual taste and habit, and this belief led him to insist on accepting whatever sounds or relations of sounds occurred as a result of the process of composition. Cage eventually came to a conclusion that the composer's act of choosing is unnecessary in the process of composition.

Cage thought that liberation from the repertory of a composer's aesthetic taste and habit was necessary so that the composer could start with the maximum number of possibilities when creating music. He observed that many composers have tried to find new materials and methods for composing which are not restricted by the tonal system. In Cage's view, most of the ways they have attempted to escape their repertory resulted in the creation of other restrictive systems, systems he thinks do not provide the variety and complexity composers could have in their music. For instance, he argued that twelve-tone technique provides no more variety for pitch relations than does the tonal system, but only provides the results generated in another organizing system. Also Cage saw attempts to combine traditional ways of determining musical materials with chance operations as compromising, and criticized them. Instead, he argued that composers can have the maximum number of possibilities in creating music only when they make a complete break with traditional ways of composing, that is, when they totally eliminate the act of choosing from the process of composition. Observing that any trace of preference, taste, intention, or habit leads to a restriction of compositional possibilities, he argues for the desirability of presenting whatever part of the unrestricted totality of possibilities happens. Obviously, Cage takes for granted the idea that any limitation of possibilities is undesirable, but it is just this taken-for-granted idea that undermines his attempt to make the range of possibilities significant.

To talk about the desirability of more possibilities is meaningless unless they are possibilities for choice. If the possibilities are not that from which the composer chooses, they remain mere possibilities. The significance of all possibilities, and of a choice, only emerges when what

was chosen can be related to other unchosen possibilities. In this respect, Cage's insistence on the total elimination of the act of choosing in the process of composition trivializes his desire for more possibilities when creating music. When a composer stops the act of choosing completely and accepts everything, there is no need for him to be concerned with creating more possibilities, since the significance of the chosen cannot be related to what could have been chosen but was not. Paradoxically, Cage's way of preserving the maximum number of possibilities for composing, negates the necessity of efforts to create more possibilities, and instead, gives reason to be free from the burden of these efforts. Moreover, Cage's insistence on "accepting" leads not only to the negation of the act of composition, because it is traces of the composer's choice that distinguish music from mere sound, but also to the complete insignificance of the entire range of compositional possibilities, since each sound is equally significant at all times, as something that is not chosen, but only happens.

Iannis Xenakis has also tried to free the selection and organization of the material in composition from restrictions of taste and habit, at least those restrictions taken for granted or unwanted. He too has denied the desirability of new systems of constraints, although not because they are constraints, but rather because the systems generated consequences that nullified the intent of the constraints and their significance. He has also created ways to generate the maximum number of possibilities for creating music. However, Xenakis' approach is motivated by purposes that diverge from those of Cage. In contrast to Cage's attempt to generate the maximum variety of material which he protects from the limitations of choice, Xenakis is always concerned with the conditions of compositional

choice: that is, he creates strategies of generation that give him more variety in material from which he can choose.

When such a situation is created, there are several advantages that it can offer both composers and listeners. From the composer's point of view, if the initial choice of material and relationships is constrained by habits and preferences as little as possible, the chances that the composer will lose consequences that could have been generated by the process of composing, if habit or preference had not excluded some relationship or material from consideration, is minimized. Moreover, the composer is less likely to reproduce or permute the meaning of material, thus, hastening its decay and robbing the compositional choices of significance. In short, the composer is not forced to create a situation in which nothing unheard and unthought of can possibly be created. Instead, composers can search for and create new ways of generating material, ways which can produce more variety of material from which they can choose, which, in turn, may spur them to develop new ways of choosing.

The composer's final choice--the choice regarding whether or not to accept the sounds and the relationships generated free from taste and habit--shapes the character of the work and establishes the distinction of the work, in relation to the distinctions of other works, and thus, allows the composer to contribute, and the composition to be a contribution, to musical, and social, thought.

When the composer incorporates, in his music, new sounds and new relationships of sounds generated by new operations, the composer gives listeners of music an opportunity to hear these new sounds and new relationships, and also an opportunity to transform their habits, taste, and thought. Therefore, the situation in which composers create strategies of

generating material with a maximum level of variety--be they strategies which produce unforeseeable results, determined degrees of randomness, or some as of yet unheard of and unthought of possibilities--if it is a situation concerned with the condition and consequences of choice, can also give rise to a situation that can free listeners from habitual and thoughtless attitudes of listening, thus allowing both composers and listeners to confront a wider range of possibilities and significant choice in the acoustical, and perhaps even, the social, world.

BIBLIOGRAPHY

BIBLIOGRAPHY

Primary Reference Sources

Behrman, David. "What Indeterminate Notation Determines." *Perspectives of New Music* 3 (1965): 58-73.

Blass, Joseph Herring. "Indeterminacy as a Factor in Scientific and Artistic Attitudes of the 20th Century." Ph.D. dissertation, Florida State University, 1968.

Boehmer, Konrad. "Aspects of Ideology in 20th Century Music." Manuscript. In Proceedings of the Conference "The Shaping of Contemporary Musical Taste," presented by the University of Wisconsin-Milwaukee, School of Fine Arts, Department of Music, April 3-5, 1986.

Bois, Max, ed. *The Man and His Music: A Conversation with the Composer and a Description of His Works.* London: Boosey & Hawkes, 1967.

Born, Max. *Natural Philosophy of Cause and Chance.* New York: Dover Publications, 1964.

Boulez, Pierre. "Alea." *Perspectives of New Music* 3 (1964): 42-53.

Brown, Earle. "Some Notes on Composing." In *The American Composer Speaks* , pp. 298-305. Edited by Gilbert Chase. Louisiana: Louisiana State University Press, 1966.

Brün, Herbert, "From Musical Ideas to Computers and Back." In *The Computer and Music* , pp. 23-36. Edited by Harry B. Lincoln. Ithaca: Cornell University Press, 1970.

_____. "Teaching the Function of Time in Art." 1952. Manuscript. In the collection of Professor Mark Sullivan, Michigan State University.

Butchers, Christopher. "The Random Arts: Xenakis, Mathematics and Music." *Tempo* 85 (Summer 1968): 2-6.

Cage, John. "Experimental Music." In *The American Composer Speaks* , pp. 226-33. Edited by Gilbert Chase. Louisiana: Louisiana State University Press, 1966.

_____. *For the Birds* . Boston: Marron Boyars, 1981.

_____. "The Future of Music." In *Esthetics Contemporary,* pp. 288-300. Edited by Richard Kostelanetz. New York: Prometheus Books, 1978.

_____. "His Own Music." *Perspectives of New Music* 25 (Summer 1987):88-108.

_____. "Interview with Roger Reynolds." In *Contemporary Composers on Contemporary Music* , pp. 335-48. Edited by Elliott Schwartz and Barney Childs. New York: Holt, Rinehart and Winston, 1967.

_____. *Silence* . Middletown: Wesleyan University Press,1961.

_____. *A Year from Monday.* Middletown: Wesleyan Univ. Press, 1967.

Cahn, Steven M. "Chance." In *Encyclopedia of Philosophy.* Edited by Paul Edwards, 8 vols. New York: The Macmillan Company & The Free Press, 1967. vol. 2, pp. 73-74.

Cavell, Stanley. "Music Discomposed." pp.180-212. Chapter 7, In *Must We Mean What We Say?* . New York: Charles Scribner's Sons, 1969.

Chittum, Donald. "Music Here and Now--III." *American Music Teacher* 21 (February-March 1972): 30, 37, and 40.

Clark, Robert Charles. "Total Control and Chance in Musics: A Philosophical Analysis." *Journal of Aesthetics and Art Criticism* 28 (Spring 1970): 355-60; 29 (Fall 1970): 43-46.

Cope, David H. *New Directions in Music.* 3rd ed. Iowa: Wm. C Brown Company Publishers, 1981.

Cormier, Ramona. "Indeterminacy and Aesthetic Theory." *Journal of Aesthetics and Art Criticism* (Spring 1975): 285-92.

Cott, Jonathan, ed. *Stockhausen: Conversations With the Composer.* New York: Simon and Schuster, 1973.

Cowell, Henry. "Current Chronicle." *Musical Quarterly* 38 (January 1952): 123-36.

DeLio, Thomas. *Circumscribing the Open Universe.* New York: University Press of America, 1984.

Ernst, David. *The Evolution of Electronic Music.* New York: Schirmer Books, 1977.

Feldman, Morton. "An Interview with Robert Ashley, August 1964." In *Contemporary Composers on Contemporary Music* , pp. 362-66. Edited by Elliott Schwartz and Barney Childs. New York: Holt, Rinehaart and Winston, 1967.

_____. *Essays.* Beginner Press, 1985.

Frankenstein, Alfred. "In Retrospect--the Music of John Cage." *High Fidelity* 10 (April 1960): 63-64.

Griffiths, Paul. *Boulez* . London: Oxford University Press, p.1978.

_____. *Cage* London: Oxford University Press, 1981.

_____. "Xenakis: Logic and Disorder." *Musical Times* 66 (1975): 329-31.

Grimes, Ev. "Conversations with American Composers." *Music Educator's Journal* 73 (November 1947): 47-49, 58-59.

Helms, Hans G. "John Cage's Lecture 'Indeterminacy'," *Die Reihe* 5:83.

Hibbaard, Tom. "Freedom by Chance: Dada and Surrealism." *Midwest Quarterly--A Journal of Contemporary Thought* 28 (1987): 364-77.

Hiller, Lejaren. *Experimental Music.* Westport: Green wood Press Publishers, 1979.

Hollander, John. "Review of *Silence.*" *Perspectives of New Music* 1 & 2 (Spring 1963): 137-141.

Jones, Kevin. "Compositional Applications of Stochastic Processes." *Computer Music Journal* 2 (Summer 1981): 45-61.

Kaufmann, Walter, ed. *Existentialism from Dostoevsky to Sartre.* New York: Meridian Books, 1956.

Kay Norman. "First Performances." *Tempo* 78 (1966):21-25.

Kirby, Michael, and Schechner, Richard. "An Interview with John Cage." *Tulane Drama Review* 10 (Winter 1965): 50-72.

Kostelanetz, Richard. ed. *John Cage* . New York: Praeger Publishers, 1970.

_____, *The New American Arts.* New York: Horizon Press, 1965.

_____, ed. "Ur-Conversation with John Cage." Perspectives of New Music 25 (Summer 1987): 88-107.

Kuh, Katherine. *The Artist's Voice: Talks with Seventeen Artists.* New York: Harper and Row, 1960.

MacIntyre, Alasdair. "Existentialism." In *Encyclopedia of Philosophy.* Edited by Paul Edwards. 8 vols. New York: The Macmillan Company & The Free Press, 1967. vol. 3. pp.147-154.

Markgraf, Bruce. "John Cage: Ideas and Practices of a Contemporary Speaker." *Quarterly Journal of Speech* 48 (April 1962): 128-35.

Matossian, Nouritza. *Xenakis.* New York: Taplinger Publishing Company, 1986.

Metzger, Heinz-Klaus. "Abortive Concepts in the theory and criticism of Music." *Die Reihe* 5:21-29.

Meyer, Leonard B. "Art by Accident." *Horizon* 3 (September. 1960): 30-32.

Nyman, Michael. *Experimental Music.* London: Cassell and Collier Macmillan Publishers, 1974.

Perloff, Marjorie. *The Poetics of Indeterminacy: Rimbaud to Cage.* Princeton: Princeton University Press, 1981.

Potte, Keith. "Earle Brown in Context." *Musical Times* 127 (December 1986): 679-83.

Reynolds, Roger. "Indeterminacy: Some Considerations." *Perspectives of New Music* 4 (1965): 136-140.

Robertson, Bryan. *Jackson Pollock.* New York: Harry N. Abrams, 1960.

Rochberg, George. "Indeterminacy in the New Music." *Score* 26 (January-June 1960): 9-19.

Rosenberg, Harold. "The American Action Painters." *Art News* 51 (December 1952): 22-23, 48-50.

Ross, Stephanie. "Chance, Constraint, and Creativity: The Awfulness of Modern Music." *Journal of Aesthetic Education* 19 (1985): 21-35.

Russcol, Herbert. *The Liberation of Sound.* New Jersey: Prentice-Hall, 1972.

Salzman, Eric. "Milton Babbit and John Cage." *Stereo Review* 22 (April 1969):60.

Schrader, Barry, *Introduction to Electro-Acoustic Music.* New Jersey: Prentice-Hall, 1982.

Smart, Ninian. "Zen." In *Encyclopedia of Philosophy.* Edited by Paul Edwards. 8 vols. New York: The Macmillan Company & The Free Press, 1967. vol. 8. pp. 366-68.

Stone Kurt, "Review of *Pithoprakta.*" *Musical Quarterly* 54 (July 1968): 387-95.

Stravinsky, Igor. *Poetics of Music.* Translated by Arthur Knodol and Ingolf Dahl. Cambridge: Harvard University Press, 1947.

Sullivan, Mark. "The Performance of Gesture: Musical Gesture, Then and Now." DMA dissertation, University of Illinois, Urbana Champaign, 1984.

Tomkins, Calvin. *The Bride and the Bachelors: the Heretical Courtship in Modern Art.* London: Weidenfeld and Nicolson, 1965.

Xenakis, Iannis. "ad libitum..." *The World of Music* 9 (1967): 17-26.

_____. *Formalized Music.* Bloomington: Indiana University, 1971.

_____. "The Origins of Stochastic Music." *Tempo* 78 (Fall 1966): 9-12.

_____. "Xenakis on Xenakis." *Perspectives of New Music* 25 (Summer 1987): 16-49.

Wolff, Christian. "Taking Chances." *Music and Musicians* 17 (May 1969): 38-45.

Secondary Reference Sources.

Boulez, Pierre. "Technology and the Composer." *Leonardo* 11 (Winter 1978):59-62.

Brün, Herbert. "Infraudibles." In *Music By Computers,* pp. 117-21. Edited by Heinz von Foerster and James W. Beauchamp. New York: John Wiley and Sons, 1969.

_____. "The Premise is that There Be Music." ICMC 1985 Proceedings.

Burger, Peter. *Theory of the Avant-Garde.* Translated by Michael Shaw. Minneapolis: University of Minnesota Press, 1984.

Cage, John. "A Few Ideas about Music and Films." *Film Music Notes* 1 (January-February 1951): 12-14.

Copleston, S. J. *A History of Philosophy* . 9 vols. New York: Newman Press, 1975. Vol 9: *Maine de Biran to Sartre.*

Faas, Ekbert. "Interview with Karlheinz Stockhausen Held August 11, 1976." *Interface* 6 (December 1977): 187-204.

Feldman, Morton. "Conversations without Stravinsky." *London Magazine* 6 (March 1967): 86-94.

Griffiths, Paul. *Modern Music : The Avant Garde Since 1945.* London: JM Dent & Sons, 1981.

Hillert, Richard. "Sources and Sounds of the New Music." *Church Music* 1 (1972): 1-9.

Hook, Sidney, ed. *Determinism and Freedom* . Washington Square: New York University Press, 1958.

Jones, W. T. *Kant to Wittgenstein and Sartre: A History of Western Philosophy.* 2nd ed. New York: Harcourt, Brace & World, 1952.

Layton, Billy Jim. "The New Liberalism." *Perspectives of New Music* 3-4 (Spring-Summer 1965): 137-42.

Ligeti, Gyorgy. "Metamorphoses of Musical Form." *The Reihe* 7:5-19.

Meyer, Leonard B. "Meaning in Music and Information Theory." *Journal of Aesthetics and Art Criticism* 15 (1957): 412-24.

Plank, Max. *The Philosophy of Physics.* New York: W.W. Norton & Company 1936.

Reich, Steve. *Writings about Music.* The press of the Nova Scotia, n.d.

Shannon, Claude E., and Weaver, Warren. *The Mathematical Theory of Communication.* Urbana: The University of Illinois Press, 1962.

Xenakis, Iannis. *Arts/Sciences; Alloys.* Translated by Sharon Kanach. New York: Pendragon Press, 1985.

Wolff, Christian. "Movement." *Die Reihe* 2:61-63.

_____. "On Form." *Die Reihe* 7:26-31.

Musical Pieces.

Brown, Earle. *Available Forms II,* New York: Associated Music Publication, 1965.

_____. "December 1952." In *Folio.* New York: Associated Music Publication, 1952-53.

Cage, John. *4"33".* New York: Henmar Press, 1960.

_____. *Music of Changes.* New York: C.F. Peters, 1961.

_____. *Variations II.* New York: Henmar Press, 1961.

Feldman, Morton. *Intersection 2 for Piano Solo.* New York: C.F. Peters, 1962.

Stockhausen, Karlheinz. *Klavierstück XI,* London: Universal Edition, 1957.

Xenakis, Iannis. *Pithoprakta.* New York: Boosey & Hawkes, n.d.

Wolff, Christian. *Duo for pianists, II.* New York: C.F. Peters, 1958.