It is one thing to search for events that will produce the sound one wants, and quite another to discover the sound of the events one wants. In the first case the wanted sound renders desirable the necessary events; in the second the wanted events are the standard for the desirability of the resulting sound. These are not only two different approaches to the composition of music, but also two different political attitudes.

Even if it should be true that the great masters of the past only rarely considered political and social issues as criteria influencing their musical decision taking in composition, this truth should not simply be trusted. The actual concern of composers for their contemporary environment is usually less known than suspected. By now, many phenomena that until recently had been attributed to human frailty, to fate, or even to the laws of nature, have been recognized as issues of political and social rather than individual and natural significance. Certainly no reliable documentation exists proving that composers remained uninfluenced by these issues, as they appeared to the composers in their day, whether the composers knew it or not. All one is allowed to conjecture is that the less composers knew of the influence, and the less they considered it, the more they became unconsciously dependent upon it.

The recent wave of growing awareness among artists and young people of the intrinsic unpleasantness which the systems we are caught in pour out over us with increasing generosity, is an augmented version of the similar wave 150 years ago. It should delight the protesting intellect to contemplate the possibility of an amalgamation of a twentieth century romanticism with the functional changes brought about by the existence of high-speed electronic computers. For it would look promising, almost reassuring, if for once in history an attempt were underway to couple the newest ideas for a better world with the latest knowledge about its potentials.

Not surprising then that a few composers are beginning to look for answers to the following two questions:

1. Is it possible to incorporate the definition of a musical idea into a computer program in such a way that the program will generate the compositional realization of that idea?
2. Is it possible to design a computer system and a computer program wherein a musical idea would function as a generator of systems so structured that the sequence of their states could be called, by the composer, a musical composition?

The quest for answers has already produced a long line of audible experiments, some of which, undertaken by composers, demonstrate the distinct possibility of a musical solution to the problem given. The composers I mean do not simply attempt to translate conventional techniques of composition into programming languages; nor are they interested in having the computer simulate traditional stylistic prejudices. They rather tend to start from scratch, to begin by stipulating what music is to be now that the assistance of computers has become available.

As a necessary preamble to this quite deliberate act of stipulation, a composer has to understand that neither music nor computers grow wild in nature. Both, music and computers, are concepts referring to systems created by human beings. It should be obvious to the composer that, therefore, a new sys-
tem has to be created, a system in which music and computers will mutually relate by analogy, by simulation, by structural correspondence, by exploitation of one another’s information potential.

During several years of research in computer assisted musical composition at the Experimental Music Studio of the University of Illinois, many problems have been solved and new problems discovered. Our general approach to the field under investigation may grossly be described as following three modes:

1. Structural analysis and synthesis of compositional logistics and logics and their reduction to, or expansion into, computer programs.
2. Analysis and synthesis of acoustical phenomena and their controlled and recorded production by a combination of analog-to-digital and digital-to-analog converters, processed and executed in computer systems.
3. Attempts at an evaluation and the application of thought and ideas with regard to musical aesthetics and forms, created by the confrontation of the composer with technological conditions.

At various stages of this project, the information already gained by that time was applied to specific purposes. The results are musical scores to be performed by musicians, tapes containing synthetic sound, and additions to the academic curriculum in musical education.

Every one of these results reflects on and illustrates the state of work in progress in any one or all of the modes of investigation mentioned above.

On the following pages I shall give an account of some thoughts and ideas which have been provoked by various aspects of the projects. Not all these thoughts and ideas deal directly with either music or computers; all, however, continuously accompany and strongly influence my work in research as well as in music composition. To me these notions express the significance of hitherto latent and now, at last, emerging potentials far better than could many a less ambiguous, less polemic technical or theoretical report. The account will occasionally be interrupted by rather concise descriptions of musical works I composed with the assistance of computers.

* * * * *

The premise is that there be music. It is a deliberately stipulated premise. As such it need not follow. It isn’t even hereditary. That there was and is music proves, at best, that the premise has been deliberately stipulated many times before, and that it has led to a variety of definite conclusions. The premise—that there be music—is not one of those conclusions.

Now, to many a fine ear attached to many a fine brain, the premise, on the contrary, appears to claim: after all those conclusions, it may now be time that there at last be music. Only, however fine the attachments, however indignant the ear-wagging, and however shocked all those appear to appear who hear what only appears to have been said—it is all appearances only. The premise is not even a reaction. Nor is it the valiant expression of free and upstanding determination to start afresh, where there’s a will there’s a way, and finally succeed where hitherto all have failed. Nor does the premise stipulate that there should be better music or other music, but just that there be music! So the premise is not competitive either, and therefore does not necessarily signal the search for any social status or the embarking on some corrective action.

In short: The deliberately stipulated premise that there be music is amoral, non-ethical, non-conformist, and asocial, partly in contrast to whoever deliberately stipulates it. For that person is not a premise; that person only stipulates one. The urge to stipulate and the choice of premise are functions of one’s views on one’s participation in society, and these views, be they affirmative or in opposition, are provoked, if not conditioned, by what happens in that society in the name of morals and ethics.

Unfortunately, more often than not, we who stipulate are conformists. Instead of intolerantly discussing only the alternative consequences and conclusions that, given the premise, we now could envisage, again and again we allow ourselves to defend the premise against those who just do not want...
new premises. And we who stipulate cannot be asocial, regardless of what we proclaim, in that we always find ourselves either pooling with or pitching against society all those strange concepts our premises generate. We are not, nor do we do, precisely what we intend to be or do. In various ways, the environment attaches meaning and significance to our expressions and actions, which inevitably transcends and, in passing, deforms all of our intentions.

This process occasionally creates a period in which one becomes all environment, and, unaware of this fact and hidden behind good intentions, one gets stuck.

Whenever I get stuck, the environment must be changed. An environment cannot be changed by obeying the environment, but only by experiments with deliberately stipulated premises which generate unexploited systems, moments of many alternatives. However, while I am caught in a feedback loop, I cannot recognize a loophole, even if there is one, because the foremost property of such a loophole is its imperceptibility. All I can do is artificially increase the probability of my hitting on a premise that does more than I intended and so might catapult me out of the loop. Thus, it finally must be added that even the most deliberately stipulated premise lacks definition if only the intentions it implies are analyzed, and that it mocks definition if it transcends all intentions.

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Sonoriferous Loops (1964) for flute, trumpet, double bass, xylophone, marimba, percussion, and two-channel tape. First performed in 1965 at the University of Illinois.

The structure of the composition, defined by elements and rules, together with an algorithm which, in numerous passes (loops), operates in and on the structure as a generating function, was translated by the composer into two programs, one for the instrumental sections and one for the tape section. Both programs call on MUSICOMP, were written in SCATRE, and executed by the IBM 7094. The “instrumental” output, a print-out, thus had to be re-coded by the composer into a score and parts legible for live musicians. The “tape” output, a deck of punched cards, was converted into actual sound by the computer CSX-1 and stored on audio tape. The final performance tape is the result of extensive modifications on the CSX-1 sound, achieved with the analog equipment of the Experimental Music Studio.

The composition and programming of this work represent an attempt at coming to musical terms with two possibilities first offered to the composers by the computer:

1. Random flight sequential choices channeled and filtered under the control of form-generating restrictive rules; this process created the shape, density-fluctuations, and parameter-details of the instrumental sections.

2. The transformation of speed of sound sequences into color and timbre of sound; this method was used for the production of the tape sections.

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Though the act of deliberate stipulation may indicate (at least today) a gesture of defiance aimed at contemporary society’s rules of etiquette in discourse; though it seems to condemn society’s assumed competence in matters of communication to irrelevance and obsolescence: the premise so stipulated must not, in itself, contain either mood or character of such defiance, nor betray any opinion of itself with regard to its relevance, its importance, or, just in general, its social and scientific value and meaning.

The premise has to appear in a statement which becomes a false statement if the premise is taken to be a member of a set of conclusions based on any other premise. The statement should be true if and only if the premise is but a premise and thus, instead of following other premises, precedes consequences.
The premise must not be authoritarian, but instead authorize a sufficiently large number of alternative possibilities of consequences. It has to require controversy among those who agree to test its potential for becoming the initial state of systems yet to be created. The controversial issue should not be which system, thus envisaged, deserves to be considered preferable, but rather the rigorous analysis of patterns emerging in each such system and the recognition of patterns common to all.

The premise must not contain any answer to the question as to whether it be true or false. Its grammatical construction alone should already make it inaccessible to logical or intuitive function rules.

And so on! Even as it is, this manifesto of commandments invites the derisive shrugging of shoulders and sundry snide remarks referring the author to logics, beliefs, knowledges, maybe even to etiquette and better behavior. But most prominently among those turning their back, friends can be heard who would agree, were it not that they, unfortunately, cannot quite help having discerned and detected a contradiction or two, self-contradictory statements made in the tentative description of the conditions under which a premise may be awarded the distinction of being called deliberately stipulated. Unhappily these friends are overly pedantic. Their regretful quibbling is nothing but cautious gesticulation conforming to all those systems ruling us, in which self-contradictions, be they a person’s or be they a thought’s entanglements between reality and desire, are put down as flaws, mistakes, errors, fallacies, and considered inadmissible. It would be better, in fact it is necessary these days, for them to recognize that an enormous number of consistent individuals and ideas, causing one social disaster after another, remain uncontradicted for reasons which the systems we have accepted, or which at least rule us, consider admissible.

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Non Sequitur VI (1966) for flute, violoncello, harp, piano, two sets of percussion, and two-channel stereo tape. Commissioned by Radio Bremen, Germany, and first performed there in 1966.

For the “instrumental” parts here again a program written by the composer in SCATRE, calling on MUSICOMP, was executed by the computer IBM 7094, resulting in a print-out, which was recoded into score and parts for musicians to read. The “tape” sections, however, were programmed by the composer for the new digital to analog sound synthesis system. The resulting sounds were used without modification just as the computer and converter system had synthesized it.

The programming of this work mainly reflects the continuous search for answers to the following:

1. What is the minimal number and power of restrictive rules that will select from random generated sequences of elements that particular variety of element-concatenations satisfying the conditions for either recognizable or stipulated “musical” forms and events?
2. Could a combination of stochastic choice rules with heuristic, multivalent, decision-taking procedures contribute an apparent “musical” coherence to a chain of changes of state in a structured system?

* * * * *

A particular system is defined by the number of elements it contains, by the number and kinds of algorithms

1. that can function in this system,
2. that can control the changes of state in this system,
3. and that can provide the entrance to and exit from the system.

Such a definition refers only to the structure and thus to the information potential of a system. It neither implies the existence nor describes the nature of the elements. The definition actually reflects only an image which someone chooses to have: the image of that context in which, for that person, a sequence of states or changes possess relevance and significance.

Systems are created by definitions. Definitions are created by people searching for relevance and
significance in their own existence and in the existence of all or part of their environment. Without the concept of system, the concepts of relevance and significance are meaningless. But they are equally meaningless with regard to so called “universal” systems, where everything is as it is and could not be otherwise because that is the way it is, “it” being everything.

For anything to be of relevance to something, to be of significance to someone, a system has to be imagined and then defined. Only artificial systems will clearly show that they have been selected by choice, thus implying the intended rejection of other, equally possible, indeed even equally reasonable, systems. Everyone will agree that the quantity of possible or reasonable systems one could imagine far exceeds the number of those one would also call desirable. On the other hand, very few people would willingly support the statement that a system may just then be the most desirable when it appears most “impossible”, most “unreasonable”. Although this statement reflects on a situation our present society has to cope with and, therefore, should recognize. Furthermore, out of all this there emerges an outline for any relevant research in aesthetics.

Whether a stated concept corresponds to some truth can be verified by comparing its linguistic content with the linguistic contents in statements accepted as true. Whether a stated concept corresponds to some reality can be verified by comparing its linguistic contents with the linguistic contents in statements accepted as describing reality. The objects of aesthetics, however, are statements not to be compared, unverifiable statements, corresponding to something still wanting in truth and reality. Where both, truth and reality, are in abeyance, but desire is not, that is where and when aesthetics sets up its deliberately stipulated values. If there is anything everlasting about aesthetics, then it is the delightfully fascinating temporariness of its objects. It is on desires that aesthetics thrive and not on fulfillments. Here then is one valid connection between aesthetics and the arts. Just like aesthetics, the arts deal rather with statements of desire than of truth and reality, and just like aesthetics, the arts develop an allergic sensitivity against all that is already considered to be true or real. In pronounced contradiction to religion, the arts condemn to obsolescence the belief in what is said to have been true always and in what is to come true later. Instead, through aesthetics, they forcefully make their contemporaries aware of what might be real and true now, regardless of belief and of recorded or predicted history.

Music, in its final appearance, as it arrives at the listener’s ear, preserves at least traces of the processes by which it emerged from chaos. The composer, having to account for time, cannot entirely undo or even replace it. As time is the inexorable accountant of sequences, either the cause or the result of events being looked at one after another, music is an analogy to all systems looked at in time, and thus, irrelevant to time’s past. This does not imply that the past is irrelevant to any system looked at in time. Relevance does not necessarily function both ways. No matter how much I admire the past, it simply cannot care about me and my acts; and still, I have to acknowledge that the past not only has passed forever, but also that it irreparably did happen. Thus the past belongs to truth and reality and not to the realm of desire. Music is stipulated, not as time’s victim but as time’s master.

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_Plot for Percussion, Touch and Go, Stalks and Trees and Drops and Clouds_, three pieces for solo percussion. (1967)

_Plot_ (for Michael W. Ranta) was first performed at the University of Illinois, _Touch and Go_ (for Allan G. O’Connor) in New York City, _Stalks and Trees and Drops and Clouds_ (for William Youhass) in Munich, Germany.

For each of the three pieces a FORTRAN program was written by the composer and run on the IBM 7094. The output tape contained the instructions for the CALCOMP PLOTTER to draw the score of symbols to be interpreted by the performer. The “notation” in the scores makes use of a selected set of symbols provided by the CALCOMP Library in the installed system. The “language” consists in the distribution, size and position of sym-
bols on the page, in various modes of connectivity between the symbols, and a few rules prefacing each piece. The “language” aims at eliciting from the musician a “musical” response, which combines instrumental action and coherent interpretation. With the help of the faculty and students of the Department of Computer Science, the composer is now developing a system of symbols specifically designed for musical requirements.

**General Preface**

The performance of any one of the three pieces requires three periods of preparation.

First period: Interpretation of the score, specification of the instruments, technical practice.

During this period you assume the numbers on the TIME axis to represent “seconds”. By strictly following these time indications while you practice each page or frame, you will discover and recognize phrases and phrase fragments, either as they emerge from the score or as you discern them or both. Once you have decided on the phrasing of each page or frame and also learned how to explicitly execute it in the given time, the first period is at an end.

Second period: For a week or so, don’t look at the piece, don’t touch it.

Third period: Interpretation of the piece, specification of macro-durations, performing practice.

During this period you take a new look at the phrases that you identified and memorized in the first period. Now you decide on the degree to which you may distort the actual duration of each phrase, without depriving it of its most characteristic attributes. Your goal is to transform commonplace coherence into absurdly stressed or shockingly condensed contortions on an apparently ill-conditioned time scale, reminding yourself here and there of the sentence: Old favorites one heartbeat ago. Look! Now they are leeches!

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The composer of music is in a position to effectively initiate, in the system composed, an algorithm analogous to the algorithm the composer would like to see initiated in the system which contains the composer. The task of aesthetics, be it the composer’s or the listener’s, is to determine, speculatively, whether the analogy implies, at least structurally, events of contemporary relevance in the system called environment; whether the composer was motivated by a vision of what would be desirable processes in that person’s contemporary society. It is not of primary importance for aesthetics whether everybody or even anybody agrees on the desirability of the processes implied by a work of art. This is rather the subject of political considerations. Political considerations, however, all too often remain without tangible substance because the contemporary significance of individual acts and decisions is ignored and thus never properly evaluated. Any research of an aesthetic nature that fails to discover what, at a given time, is believed to be true and real, and what, at the same time, is desired to be or to become true and real instead, fails to give food to political considerations and thus, simply, fails.

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A FORTRAN program written by the composer and run on the ILLIAC II generates data to be converted into sounds on audio tape by the digital-to-analog system.

Substituting sequences of different single periods for the modulation of simultaneous frequencies, the composer is able to control the infrastructures of the event-forming sound just as precisely as the macro events of the composition. Thus “pitch” becomes a result of composition. The same holds true for the concept of sound timbre. The differences between complex waveforms that are the results of instantaneous addition of amplitudes on the one hand, and the results of the periodic repetition of sets containing sequences of different single periods on the other hand, thus become available to the composer as musical parameters.
The most dangerous person, the most terrifying daily human threat to human society, the most insidious law-abiding culprit forever protected by the legal fetishists of innocence, his secret accomplices, is the self-appointed moron. Not to be confused with the natural moron who, lacking intelligence, is incapable of thinking about knowledge, the self-appointed moron, having some sort of intelligence, uses it to avoid thinking about knowledge. The self-appointed moron is he who recoils in terrorized modesty and complains of lacking communication whenever a thought he never had is proposed in word or script, who then cries, displaying well-faked gestures of frustration: “it’s wrong it’s bad it’s nonsense!” which, in translation, means that, to him, it is neither customary usage nor his own. The self-appointed moron is he who makes himself believe, until he honestly believes, that interesting things have the property of being interesting, that things are capable of relating to him, of all people, of all things, if only they would—please would—and who is incapable of relating to himself—damn him. The self-appointed moron is successful in, but of no good to, society. To no good, he successfully tries to use his high social status as an argument for his personal value. To no good he successfully uses his reputation of being a guardian of culture as an argument in support of his definition of culture. To no good he successfully mobilizes religion, enslaves logic, bagatellizes experience, and exploits hope in order to propagate his own allegedly innocent helplessness as it meets with his own allegedly unintended propagation of war, murder, fraud. He is successful, but his success is conspicuous for spelling failure, injustice, disaster. And for all the complexity and variety of such unfortunate influences on social affairs, matters of state, and human dignity, less cause for wonder is to be found than embarrassment. The self-appointed moron, though powerful, is not a monster but much rather an obedient servant: he shirks all responsibility for the rules he obeys simply by believing in them. He believes in them so much that even an event he dislikes will find his approval if it is a consequence of the rules in which he believes. Rarely will it occur to him to doubt his belief, to doubt the rules. He will rather denounce mankind for being intrinsically bad than to suspect himself and his beliefs. Far too many political leaders, heads of state, composers, poets, professors, bosses, critics, publishers, chairmen, judges, lawyers, doctors, parents, teachers, police officers make their living as self-appointed morons, as realists who know better than to know better.

The only valid excuse for them is their ignorance. A particular ignorance. They all have agreed, by convention, to ignore the possibility of happiness being a desirable premise rather than only a desirable consequence. Even the best among them retreat into mumbled apologies as soon as an idea that possesses them is questioned for reasonability. With liberally docile meekness, they confuse the social status of being right with the revolutionary action of demanding to become right.

All the arts, and among them also music, occupy a strange position in this dirty mess. It does not matter much what has been said and written and confessed about the arts: in one way or another, the arts were always analogies to something of significance in their contemporary environment. Some intentionally, some by mistake. Even if one were to grant equal significance and relevance to intended and unintended analogies, even if one were to observe that the arts are full of both, it is of importance to note that only the realized intentions determine whether a particular analogy will become a work of art, or not. There can be no bad art; but there may be no art, if an artist or a composer fails in transforming the intentions of an analogy into poetry or painting or dance or music or . . .

When, that is the question, when will sound, organized or not, be music? And why, even if it were what it should be, should it be? There are answers to these questions, provided they are asked, and provided anyone is around who likes answers even though the answers may not appeal to the one who questioned, not appeal to one’s craving for secure knowledge, not appeal to one’s educated sense of consistency and coherence and reasonable argument. A possible answer, for example, might run as
follows:

Sound will turn into music if the concatenations of its appearances follow a set of rules which were, however, invented and deliberately stipulated by a social being, by one who thus hopes to demonstrate and, maybe, even to render understandable to one’s environment one’s desire for a structure that has not yet been observed as possible in this environment.

Any so stipulated structural premise, not permitted or warranted here and now, may generate a system of sound events which would be music, because of its being analogous to structural possibilities envisioned as being permitted and warranted in some environment here, but later. And there should be music because of the composers today who are willing to take on the challenge of structural intricacies and information potentials of systems in sound which are compatible, and thus capable of communication by analogy, with those social systems that rule our lives.

For these composers the deliberately stipulated premise that there be music is a vital premise and a political necessity. Obviously, it would be without any substance, were it not that there is political significance to musical ideas. And that there is, I now stipulate. For neither do I wish to see myself as a natural moron, who waits and waits for reality to confirm his notions; as if what is real could, at the same time, be a standard for what ought to be real. Nor will I settle for the role of the self-appointed moron whose hope and ambition it is to confirm reality. I contend it to be a real improvement that, slowly, people are beginning to note that there is political significance to musical ideas. Just because musical ideas are deliberately stipulated premises, just because musical ideas can conjure up the analogy to a reality we are not yet caught up in, which has not yet warped our ability of committing ourselves to changes almost impossible to envision from where we stand now.

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A FORTRAN program written by the composer and run on the IBM 7094 generates instructions for the CALCOMP PLOTTER to draw various sets of figures.

The program simulates a process by which different shapes, each created independently and randomly somewhere on the page, appear to be mutations of one another. Seemingly uninterrupted chains of gradual transformations connect the shapes, thus suggesting a continuity which appears to cause the shapes, but is actually caused by the shapes. The graphic displays turn into scores as soon as an interpreter translates their structural characteristics into the instructional code of another medium (music, movement, etc.) and, following the translations, recreates the simulated process by analogy.

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The largest, most general and thus most flexible systems one can control today are found among the electronic high-speed digital and analog computer installations. The number of states representable by such machines is enormous; the elements, simple and semantically uncommitted, can stand for almost anything enumerable, quantizeable, measurable; the network potential offers the structural conditions for nearly any algorithm one can think of. Thus it is a system especially designed for utmost compatibility with all kinds of other systems, large or small, simple or complex, open or closed, numerical or logical. It is, therefore, up to someone (the computer user) to find or to construct the system in which one’s problems can be expressed and solved, in which the processes one desires to observe and to test can be seen as chains of transformations. Once one has defined the system one needs, one is able to plant it as a subsystem into the computer. This “planting” procedure is usually referred to as “programming”.

A computer program is a set of instructions. If fed into the computer system in an appropriate code, the
program communicates to the computer the structure, size, dimensions, rules, algorithms, etc., of a system which the computer system is to simulate. Under the control of such a program, the computer system will act as an analogy to the system which the programmer had in mind when writing the program. It is quite probable that not all composers think of their activities as being operations on and in systems; that not all processes leading to the final appearance of a musical work take place in only one or in any system. However that may be, the computer has to be programmed in order to be of any assistance, and a program can only be written by one who considers at least part of the work, the processes and the data with which one is concerned, as changes in and states of a system that one has defined. The main problem thus appears at the beginning and again at the end of the entire proposition: Can the composer program musical ideas for a computer, and will the output of the computer contain musical ideas?

Notes

1. Computer assisted musical composition at the Experimental Music Studio, University of Illinois:
   2. Lejaren Hiller *The Flying Lesson* (from music for *The Birds* by Aristophanes) (1958)
   3. Robert Baker *CSX-1 Study* for tape alone (1963)
   5. Herbert Brün *Sonoriferous Loops* for five instruments and tape (1965)
   6. John Myhill *Scherzo a Tre Voce* for tape alone (1965)
   7. Herbert Brün *Non Sequitur VI* for six instruments and tape (1966)
   8. Herbert Brün *Three Pieces for Solo Percussion* (1967)

   9. Lejaren Hiller *Algorithms I* for nine instruments and tape (1968)
   10. Lejaren Hiller *An Avalanche for Prima Donna, Pitchman, Player Piano and Percussionist* (1968)
   11. Herbert Brün *Infradibles* for tape alone (1968)
   12. John Cage and Lejaren Hiller *HPSCHD* for keyboard and any number of tapes (1968)
   13. Herbert Brün *Mutatis Mutandis* graphics for interpreters (1968)

Student Compositions:

   2. Frank Moore and Michael Ranta *Piece for Jazz Set* (1966) Percussion duo
   4. James Cuomo *Zetos I - V* five compositions for various groups of instruments (1967)
   5. Neely Bruce *Fantasy for Ten Winds, Percussion, and Tape* (1967) (only in parts a computer generated score)

2. For example: Music 320 *Composition of Music with the Assistance of Computers.*

   Under this title I inaugurated a two-semester seminar in 1966, designed to inform advanced composition students about possibilities offered and the problems posed by modern technology. An introduction to various aspects of computer systems and logistics was followed by the discussion of programming procedures and languages. An elementary instruction in using SCATRE and FORTRAN enabled the students to write short programs and run them on the IBM 7094. From here on it became possible to compare compositional logic, as they had learned and applied it before, to programming logic and to discuss the conditions of compatibility between one and the other. The problem of translating musical ideas into a program was investigated and the influences discovered, which the availability of powerful algorithms and system control might exert on the conception of musical ideas. As a result of this seminar, students proceeded to write programmed compositions, some of which are noted above. (see Note 1.)

3. MUSICOMP = MUsic Simulator Interpreter for COnpositional Procedures.

   Written by Lejaren Hiller and Robert Baker, MUSICOMP is a compiler program in SCATRE for the IBM 7094 at the University of Illinois. This compiler accepts subroutines for various compositional problems; it is constantly being augmented by composers.