

# **Lejaren A. Hiller: Computer Music Pioneer**



**Music Library Exhibit:**

**May 24-Sept. 7, 2004**

Curated by John Bewley

## Case 1

Lejaren Arthur Hiller, Jr. led a remarkable life. His learning encompassed the fields of chemistry, computers, electronics, acoustics, information theory, linguistics, and music. Acknowledged as being the composer of the first significant computer music, he spent much of his musical career fighting the musical establishment's perception of him as an amateur musician who was only capable of writing computer-assisted, mechanized music. His music remains largely unstudied even today, ten years after his death in 1994.

Hiller was born in New York City in 1924. His father was a noted illustrator and photographer. Hiller received musical training during his teenage years, including piano studies, saxophone, oboe, and clarinet lessons, harmony, and composition. He was admitted to Princeton University in 1941. He completed his studies in chemistry with the completion of his Ph.D. in 1947 at the age of 23.

Hiller also continued his musical training while at Princeton. He studied counterpoint, ear training, and composition with Milton Babbitt 1941-42 and composition, analysis, and fugue with Roger Sessions until Sessions left Princeton for Berkeley in 1945. Following his 1947 graduation Hiller went to work as a chemist for DuPont in Waynesboro, Virginia until 1952. During that period Hiller successfully created a process for dyeing acrylic fibers. Although Hiller decided to leave DuPont to return to an academic position at the University of Illinois, DuPont demonstrated their appreciation for Hiller's work on acrylics by writing him a bonus check for \$12,000, a considerable sum of money in 1952.

Hiller started his new position at Illinois in November 1952 after spending several months touring Europe with his wife, Elizabeth. He worked as a research associate on a government-supported project on synthetic rubber research. Frederick Wall, who had hired Hiller, requested that Hiller perform analyses on the newly available Illiac computer. This work was the catalyst for Hiller's application of his knowledge of computing to music beginning with the composition of the *Illiac Suite* with Leonard Isaacson in 1955-57.

After his work on the *Illiac Suite*, Hiller was no longer satisfied with teaching in the Chemistry Department. Frederick Wall offered him the opportunity to transfer to the Music Department in 1958 (Hiller had earned his Master's degree in music at the University of Illinois by then) and to establish the Experimental Music Studio, only the second center for electronic music in the United States. He continued to teach in the music department at the University until 1968.

Biographical information form for the *Encyclopedia of Modern Music* with interesting description in Hiller's own words of his career and public standing.

ENZYKLOPÄDIE DER MODERNEN MUSIK / ENCYCLOPAEDIA OF MODERN MUSIC

Herausgeber / Publisher : Hans Ulrich Schumann

D-534 Bad Honnef, Hauptstrasse 31 (Federal Republic of Germany)

- mit Unterstützung der Deutschen UNESCO-Kommission, Köln / with support of the German Commission for UNESCO, Cologne -

1) Familienname / Name / Nom / Apellidos / Фамилия

HILLER

2) Vornamen / Christian's Names / Prénoms / Nombres de pila / Имя и отчество

LEJAREN (ARTHUR)

no longer use professionally

3) Geburtsort und -datum / Place and date of birth / Lieu et date de naissance / Lugar y fecha de nacimiento / Место и день рождения

NEW YORK, N.Y., USA. 23 FEB. 1924

4) Staatsbürgerschaft (frühere und gegenwärtige) / Nationality (former and present) / Nationalité (d'origine et acquise) / Nacionalidad (de origen y adquirida) / Гражданство (преж- нее и настоящее)

USA

5) Studien, Schüler von ... künstlerisch beeinflusst von: / Training - mention teachers who specially influenced you / Formation, études avec ... particulièrement influencé par: / Estudios, discípulo de ... especialmente influido por ... / Ученик у ... особенно под влиянием ... /

PRIVATE, NEW YORK CITY, - HARVEY OFFICER  
PRINCETON UNIVERSITY - MILTON BABBITT AND ROGER SESSIONS  
UNIVERSITY OF ILLINOIS - HUBERT KESSLER  
- OTHERWISE I WAS MOSTLY SELF-TAUGHT -

6) Stilrichtung der Kompositionstechnik / Style and tendency of composition technique / Style et technique de mon langage musicale / Estilo y tendencias de la técnica de composición / Направление моего стиля, течения композиторской техники

I STARTED AS A COMPOSER ORIENTED TO TRADITION, BECAUSE I ALSO HAD SCIENTIFIC TRAINING, I THOUGHT I SHOULD MASTER MY CRAFT BEFORE I EXPERIMENTED. THEREFORE, MY EARLY WORKS ARE CONSERVATIVE RELATIVE TO MY PEERS. BUT THEN I MOVED GRADUALLY TOWARD INNOVATION, TOWARD SERIALISM, ELECTRONIC MUSIC, COMPUTER MUS. MULTIMEDIA, ETC. I FIND THAT THE OLDER I BECOME, THE MORE I DIVORCE MYSELF FROM TRADITION, QUITE THE OPPOSITE OF THE CONVENTIONAL PATTERN OF YOUNG ICONOCLAST MATURING TO REACTIONARY "OLD MASTER".

7) Kompositionspreise und Auszeichnungen, Stipendien / Composition prizes and awards, scholarships / Prix de composition musicale, distinctions, bourses / Premios de composición y distinciones, becas / Композиторские премии, награды, стипендии

NOT TOO MANY. IN THE U.S., I AM REGARDED AS TOO DISRESPECTFUL OF THE MUSICAL ESTABLISHMENT TO MERIT AWARDS. I HAVE NEVER ENTERED COMPOSITIONS IN CONTESTS, NEVER I HAVE HAD AWARDS LIKE FULBRIGHT LECTURER TO POLAND (1973/74) THAT I CONSIDER IMPORTANT, TO BE FAIR, BUT IN

8) Berufliche Tätigkeiten (mit Daten) / Appointments (with dates) / Emplois (avec dates) / Empleos (con fechas) / Определения на службу (с датами)

RESEARCH CHEMIST, E.I. du Pont de Nemours, Waynesboro, VA. (1947-52)  
PROFESSOR OF CHEMISTRY, UNIVERSITY OF ILLINOIS, URBANA, ILL. (1952-58) } GENERAL, I AVOID SUCH STUFF.  
PROFESSOR OF MUSIC AND DIRECTOR OF EXPERIMENTAL MUSIC STUDIES, UNIVERSITY OF ILLINOIS (1958-1968)  
FREDERICK B. SLEE PROFESSOR OF MUSIC AND CO-DIRECTOR (with Lukas Foss) of Center of the Creative and Performing Arts, State University of New York, Buffalo, N.Y. (1968-

9) Entscheidende Lebensereignisse / Landmarks in your career / Points décisifs dans votre carrière / Sucesos decisivos de su vida / Решающие события Вашей жизни

IN MUSIC: Composing Illiac Suite for String Quartet (now called String Quartet No. 4) as first important computer music, not only because it was a first, but also because it provided means of switching professionally from science to music as a career.

10) Hauptverleger (Adresse) / Principal publisher (address) / Éditeurs principaux (adresse) / Editor principal (dirección) / Главное издательство (адрес)

Theodore Presser Company, Bryn Mawr, Pennsylvania, 19010

I compose (1) for all types of ~~and~~ traditional ensembles and instruments (chamber music, symphony orchestra, vocal groups, solo piano, etc.) (2) Also for theater, TV, cinema and multimedia (3) Experimental music; electronic, computer, indeterminate. I have in the past even done some arranging of popular music for dance bands, TV commercials etc. Attached is a complete list of works listed chronologically. If you wish a reduced list with only "principal works", use those with \* in front of title. However, in a way I consider all the pieces on the list important enough to save. The others I have thrown away.

12) Bitte geben Sie Analysen Ihrer wichtigsten Werke auf beiliegenden Bogen «A»! / Analyse your key works, please, on the enclosed sheets «A»! / Donnez, s.v.p., des analyses d'auteur de vos œuvres clés sur les feuilles «A» jointes! / Envíenos, por favor, una Análisis del autor de sus obras más importantes sobre las hojas "A" adjuntadas! / Дайте, пожалуйста, авторские анализы Ваших важнейших произведений на прибаленных листах А!

13) Literatur über Sie ( Autor, Titel, Jahr, Seite, Jahrgang bei Zeitschriften ) / Writings about you ( author, title, year, page, vol. of periodic ) / Ecrits sur vous ( auteur, titre, année, page, vol. de journaux ) / Literatura sobre Ud. ( autor, título, año, página, volume de la revista ) / Литература о Вас ( автор, заглавие, год, стр., том журнала )

Many references in books on contemporary and experimental music. A good example are the entries in Dictionary of Contemporary Music, edited by John Vinton.

14) Eigene theoretische Schriften / Writings by you / Ecrits par vous / Escrituras teóricas de Ud. / Книги и статьи написанные Вами

#### PRINCIPAL BOOKS:

- (1) Experimental Music (co-author Leonard Isaacson), McGraw-Hill Book Co., N.Y., 1959
- (2) Informations-theorie und Computermusik, Darmstädter Beiträge zur Neuen Musik, v. Schott's Söhne, Mainz, 1964
- (3) 40 Articles in music journals, magazines, record albums, etc. mostly on experimental music. I can supply list if you desire.



Lejaren Hiller joined the Music Department faculty at the University at Buffalo in 1968. He served as Co-Director of the Center for the Creative and Performing Arts 1968-1974. Ill health forced Hiller to retire from the faculty in 1989. He was the author of three books, more than 80 articles on music, electronics, computer applications, and chemistry, and composer of more than 70 scores. Lejaren Hiller died January 26, 1994.

**Excerpt from Hiller interview with Vincent Plush, November 12, 1983 regarding Hiller's musical studies at Princeton.**

*"The first person I met at Princeton in the Music Department was Milton Babbitt. I still very clearly remember going in and being interviewed by Milton. At that point he was, of course, just a beginning instructor there, he was a young man himself, and he was stuck with handling all the freshman theory classes. So I showed him things like that march I mentioned, and a few other odds and ends, those old pieces, I don't remember what I showed him, but he moved me out of the first-year course and put me into strict counterpoint, which he himself taught, the sophomore course.*

*It was thorough, I can tell you, and he was fanatic about getting it right. I can still, I think, write strict counterpoint in my sleep practically, and I give all due credit to Milton. He loved that kind of abstraction. And it's interesting that this, I think, appealed to him almost as much, in terms of teaching, as say teaching the material he's famous for now, set theory and all that sort of thing. There are many similarities, if you think about it. And so I spent a whole year in that. We went through all the species, if I remember right, up to four parts. Then I moved on to work with Roger Sessions as a composing student."*

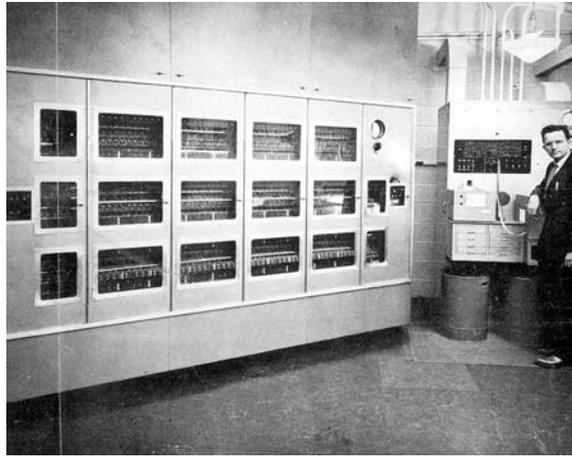


Photograph of Milton Babbitt and Lejaren Hiller, ca. 1980

*Photograph by Irene Haupt*

## Case 2

Lejaren Hiller's first foray into computer music was his *String Quartet No. 4*, also known as *Illiad Suite*, for the Illiac computer on which it was programmed. Hiller worked on the piece 1956-57 while still working full time in the Chemistry Department at the University of Illinois. He was assisted in the project by fellow chemist, Leonard Isaacson. The piece is recognized as being the first significant computer music composition.



Photograph of Lejaren Hiller with Illiac computer,  
University of Illinois, ca. 1956

**Excerpt from interview with Vincent Plush, November 12, 1983.**

Hiller began his master's degree in music at the University of Illinois around 1954 and completed it in 1958, the year he was transferred to the faculty of the Music Department. In the following excerpt he discusses how he adapted the computer programming he was then using for research in chemistry to the composition of *Illiac Suite*.

*“While I was in the Chemistry Department I wrote the Illiac Suite, the computer piece, and of course, being not in the field, I was in a state of total frustration about music. As you can tell from the list of compositions, I’d written by this point some 20 pieces of music, more or less, that I considered salvageable. Leonard Isaacson and I did this Illiac Suite completely as a bootleg job at night on the Illiac I. The programming came about because I actually adapted some of the rubber molecule programming to the writing of counterpoint. In other words, I had an idea one day when I was hanging around the chemistry lab just doing I don’t know what, when I thought, “Well, you know, if I change the geometrical design of this random flight program I’ve written,” which had gotten quite complicated, “Change the parameters – the boundary conditions, so to speak – I can make the boundary conditions strict counterpoint instead of tetrahedral carbon bonds.” And that’s how it all started. And in fact I did do that, I induced another chemist working there, Leonard Isaacson, to go in on the programming with me. We just started this as a lark, so to speak, and produced a few experiments. And then again, after many years, Milton Babbitt enters into my life again. I was down in New York one day, and went over to his house, just on a social occasion, as far as I can remember, and I mentioned what I was doing. I can still remember him taking a sort of double take. He said, “My God, that **is** an interesting idea.” And, “Why don’t you pursue the idea?” That made me begin to take it a little more seriously, and I, in fact, then launched the Illiac Suite in earnest. We did this all on our own. Well, we got three movements of it done. Don’t forget, I was still teaching chemistry.”*

Program and notes for premiere performance of *Illiac Suite* (*String Quartet No. 4*),  
August 9, 1956, University of Illinois

ILLINI COMPOSERS SERIES

Sponsored by  
School of Music

Wedgewood Lounge  
Illini Union  
August 9, 1956  
8:00 P.M.

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PROGRAM

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"Unterhaltung" Sanford Reuning  
A Sonata for Solo Violin  
Adagio  
Allegro con spirito - fugato  
Adagio con espressione  
Presto

Alcestis Bishop, violin

Miniature Quartet(militaire) James Barnett  
Alcestis Bishop, violin Robert Swenson, cello  
Sanford Reuning, violin George Andrix, viola

Sonata for Solo Viola George Andrix  
(First and Second Movements)  
Prelude  
Scherzo

George Andrix, viola

[  
Illiac Suite for String Quartet L.A. Hiller  
Presto - Andante - Allegro and  
Adagio L.M. Isaacson  
Allegro con brio  
Peggy Andrix, violin Sanford Reuning, violin  
George Andrix, viola Robert Swenson, cello

## COMPUTER MUSIC AND THE ILLIAC SUITE

Last fall we became interested in seeing whether automatic high-speed digital computers such as the Illiac, located here at the University of Illinois, could be used to generate music subject only to general instructions derived from known rules of composition. This appeared to be an attractive non-mathematical application of high-speed computers, like programming computers for playing chess, for language translation, and for weather prediction.

The ILLIAC SUITE is a chronological record of experiments carried out this past year from September to April. Our first objective was to generate a recognizable form of music to demonstrate that the technical problem could be handled. We selected four-part first species counterpoint as a test situation, since strict counterpoint is a logical abstraction of many of the basic problems of musical composition. The first two movements of the ILLIAC SUITE consist of sequences of cantus firmus settings; thus, in the first movement a limited number of strict counterpoint rules were used to generate first cantus firmi alone, then two-part settings, and finally four-part settings illustrating how we progressed from monody to polyphony. For the second movement, the counterpoint program was rewritten to add the remaining rules of counterpoint. This movement is a sequence of musical phrases starting with completely random white-note music and with each pair of phrases that is played, counterpoint rules are added until at the end of the movement all the rules are in operation. It might be noted that this particular program requires more than 1900 separate mathematical operations to operate successfully. About 50 cantus firmus settings can be produced per hour by the Illiac.

In the third movement, we have assembled a record of how the problems of rhythm, dynamics, and color effects were treated. Chromatic writing, at first purely random and subsequently controlled by some simple rules of composition, is superimposed upon the basic rhythm, dynamics, and color effects output. This movement is an elementary example of how a computer can be used to produce new tonal effects as opposed to the imitation of known musical styles. It is in this general area that we have been working since completing the ILLIAC SUITE. In particular, we are concerned with developing general principles of operation to replace the rather specific rules of composition thus far used.

Automatic high-speed digital computers operate in principle much as do ordinary desk calculators, but with certain significant differences. Perhaps the most important difference is that a whole computing program, entirely expressed in terms of mathematical operations, is placed into a computer prior to the actual process of computation. This eliminates delays due to the slowness of the human operator in handling numbers being produced during the period of computation. A second important difference is that automatic digital computers have what is called a "conditional transfer" process. In the Illiac, this is essentially a yes-or-no choice of operation which permits the programming of decisions which depend upon whether numbers bear positive or negative signs. It is this operation used repeatedly and sequentially, perhaps more than any other, that permits us to write programs for the computer expressing logical processes of musical composition.

We resolved the process of generating computer music into two basic operations. In the first operation, the computer is instructed to generate random numbers which are equated to the notes of the musical scale (and in later experiments, also to rhythmic patterns, dynamics, and color effects such as arco, pizzicato, col legno, etc.). These random numbers can be generated at a rate of about a thousand per second for the second and more complex operation, in which the random numbers are subjected to arithmetic tests expressing various rules of composition. After being generated, each random number is screened through a series of tests and either used or rejected depending upon the rules in effect. If accepted, the number is used to build up a "composition" and stored in the computer until the completed composition is ready to be printed out. On the other hand, if it is rejected, a new random number is generated and examined. This process is repeated until a satisfactory note is found or until it becomes evident that no such note exists, in which case part of the composition thus far composed is automatically erased to allow a fresh start.

At the present time, there seem to us to be two basic areas of interest in this problem. The first is the purely technical question of how to program a computer to handle musical problems of continually increasing complexity, while the second is the question of the value of a computer in the field of musical composition. A number of musical applications seem to merit attention and of these we should like only to mention tonight some ways in which computers increase the tonal resources of composers. One thing a computer does for a composer is to handle many of the details of composition and reduce them to routine, thus freeing him to concentrate on more purely abstract sets of symbols and operations. The details of music composed in this way become less consequential as such and can vary over wide limits and yet have the same overall predictable aesthetic effect. Secondly, a computer can generate music that an unaided composer cannot write since the computer is completely unbiased and obeys exactly the instructions the operator gives it, no more, no less. It is thus possible to use the computer as an experimental device to study how various compositional procedures affect the texture of music and how they may be combined to produce novel musical effects.

L. A. Hiller, Jr.  
L. M. Isaacson

United Press news release about premiere of *Illiac Suite*, August 10, 1956.

HX4A

UP NEWS RELEASE  
AUG. 10, 1956

(ILLIAC)

CHAMPAIGN, ILL., AUG 10-(UP)--A MUSICAL SUITE COMPOSED BY AN ELECTRONIC BRAIN WAS INTRODUCED BY A STRING QUARTET LAST NIGHT, BUT SOME LISTENERS DIDN'T DIG THE BEAT.

"WHY, IT DOES AWAY WITH THE NEED FOR HUMAN COMPOSERS," ONE WOMAN MUSIC LOVER REMARKED GLUMLY,

ANOTHER LISTENER SAID THE FINAL MOVEMENT OF THE COMPOSITION SOUNDED LIKE A "BARNYARD."

OTHERS AMONG THE AUDIENCE AT THE UNIVERSITY OF ILLINOIS APPEARED RESENTFUL THROUGHOUT THE 15-MINUTE PERFORMANCE.

BUT PROF. ROBERT SWENSON, CELLIST AND LEADER OF THE QUARTET, SAID THE COMPOSITION, THE "ILLIAC SUITE" WAS, "GOOD."

THE SUITE WAS COMPOSED BY ILLIAC, THE UNIVERSITY'S HIGH-SPEED DIGITAL COMPUTER.

THE COMPOSITION COVERED MUCH OF MUSICAL DEVELOPMENT FROM THE 16TH CENTURY ONWARD.

THE FIRST OF THE THREE MOVEMENTS WAS A SIMPLE PRESTO-ANDANTE-ALLEGRO WHICH COULD HAVE COME FROM THE PEN OF PALESTRINA. THE ADAGIO SECOND MOVEMENT LEANED TOWARD THE MODERN, AND THE THIRD ALLEGRO CON BRIO MOVEMENT WAS FRANKLY EXPERIMENTAL.

ILLIAC'S EFFORTS AT CLASSICAL MUSIC WERE SPONSORED BY L. A. HILLER, A CHEMIST-COMPOSER, AND L. M. ISAACSON, A RESEARCH ASSOCIATE.

HILLER TRANSLATED THE BASIC RULES OF COMPOSITION INTO ILLIAC'S LANGUAGE OF MATHEMATICAL SYMBOLS, THEN TAUGHT THE MACHINE TO PRODUCE RANDOM NOTES, REJECTING THOSE WHICH WOULD NOT FIT.

TP428A..

## Excerpts from interview with Vincent Plush, November 12, 1983

Hiller experienced the full range of reactions to the premiere of *Illiac Suite*, from intense interest to condemnation.

*“In the summer of 1956, I decided to get three of the movements of it – the fourth movement was still not written – performed at Illinois, because Jack Nash (who had been teaching the Illiac course) had asked me to give a presentation at the Association for Computing Machinery in Los Angeles, at UCLA, on composing music with computers. I had given a couple of seminars for the computer group at Illinois. And so I said, “Okay, I’ll do that.” So then I had to have the tapes of at least some of the music to demonstrate what we had done.*

*... Well, the thing [performance of Illiac Suite] hit the headlines. It was really a strange summer, because I went from total obscurity as a composer to really being on the front page of newspapers all over the country.*

*... I would say the great preponderance of reaction was that I was some sort of scientist who should know better than to meddle in musical matters. There was a great of hostility, certainly in the musical world, without question. With very few exceptions. As I pointed out, Milton Babbitt was one who perceived the possible virtues of this approach. But in general, I’d say the hostility index was extremely high, and certainly, although it made me famous in a way, it made it very difficult, too, because I was immediately pigeonholed as an ex-chemist who had bungled into writing music and probably wouldn’t know how to resolve a dominant seventh chord. I had to fight for years, this kind of reputation. In fact, I still occasionally run into it. Prejudices die very hard, but I think by now it is perceived that I am in fact a well-trained composer by the composing community the world over, as you perfectly well know. But it was a long struggle to get myself out of that business of being an ex-chemist who had meddled in something in which he was a bumbling amateur.”*

Letter from Iannis Xenakis, April 10, 1962 in which he asks Hiller to send a copy of his book, *Experimental Music*, with its description of *Illiac Suite*.

10-4-62

My dear friend,

Thanks a lot for your letter and the two tapes.

Could you send me articles on electronic music and computers? I would like very much also to read your book on the *Illiac Suite* I think which ~~has~~ belongs to Moles. But he is very secret, and in any way I would like to have it myself.

IBM will present <sup>internally</sup> (to world press) a piece of "Free Stochastic Composition" for 10 players entitled ST 10-1, 080262.

I have not yet written a paper on this but only a small explanation which will be published in the IBM review. I'll send it to you when it comes out.

Do you receive the *Gr. Blätter*? If not, just a note and I'll send you the letter No 23/24 containing the last summer's encounter at Gravesano.

Best wishes to you and your wife

Yours

Xenakis

## Case 3

In 1967 Hiller arranged for John Cage to be appointed an Associate Member of the Center for Advanced Study at the University of Illinois. When the original plan for Cage to work with a programmer at the university fell through, Hiller began assisting Cage with the computer aspects of his planned composition, a work for harpsichord, commissioned by Swiss harpsichordist Antoinette Vischer. Hiller's role gradually grew to the level of true collaboration so that he and Cage now receive equal credit for the resulting work, *HPSCHD*.

*HPSCHD* is an enormous multi-media event. The premiere performance required 7 harpsichords, 208 tapes (4 copies of each of the 52), 52 tape-players (13 stations with 4 each), 59 amplifiers and loudspeakers, 6,400 slides (5,000 from NASA), 64 slide projectors, 40 films, 8 motion picture projectors, 11 100 x 40 foot silk screens and a 340 foot circumference circular screen made by Calvin Sumsion. It was attended by approximately 8,000 people and lasted for close to 5 hours.

Program for May 16, 1969 premiere performance of *HPSCHD* at University of Illinois.



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# HPSCHD

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for Antoinette Vischer

Music: John Cage and Lejaren Hiller (1967-69)

Images: Ronald Nameth and Calvin Sumsion

Presented at the Assembly Hall, University of Illinois at Urbana-Champaign, on May 16, 1969, from 7:30 P.M. to Midnight, by the School of Music, University of Illinois, and by the Assembly Hall. This first performance was designed especially for the Assembly Hall, and the production was made possible by grants from the University of Illinois Research Board and the Thorne Music Fund, Inc.

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## Music

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Twenty-minute solos for one to seven amplified harpsichords and tapes for one to fifty-two amplified monaural machines to be used in whole or in part in any combination with or without interruptions, etc., to make an indeterminate concert of any agreed-upon length having two to fifty-nine channels with loud-speakers around the audience.

Solo I		David Tudor Baldwin Solid Body Harpsichord
	Computer printout for 12-tone gamut	
Solo II		Antoinette Vischer Neupert Double
	Mozart Dicegame	
Solo III		William Brooks Challis Single
	Dicegame with Mozart compositions used as replacements, treble and bass linked	
Solo IV		Ronald Peters Brueggeman Double
	Dicegame with Mozart compositions used as replacements, treble and bass independent	
Solo V		Yuji Takahashi Dowd Double
	Dicegame with historical sequence used as replacements, treble and bass linked	
Solo VI		Neely Bruce Hubbard Double
	Dicegame with historical sequence used as replacements, treble and bass independent	
Solo VII		Philip Corner Neupert Double
	Practice or performance of any Mozart compositions	

In addition to playing his own solo, each harpsichordist is free to play any of the others. Monaural tapes giving all divisions of the octave from five to fifty-six tones performed by: Al Blatter · Morgan Powell · Dennis Kamm · James Knapp · James Fulkerson · Mary Fulkerson · Thomas Howell · Jon Bauman · James Stroud · Dennis Eberhard · Joe Sekon · Udo Kasemets · Clive Coen · Peter Salemi and others. At approximately 8:30 and 11:00 p.m. there will be a concert of all channels. The audience is free to move in and out of the building, around the Hall, and through the performing area.

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## Music credits

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Sound system and recording: Jaap Spek and George Ritscher. Generation of computer sounds on tape accomplished with the assistance of: James Cuomo, Paul Krabbe, and James Stroud. Computer programming: Lejaren Hiller, John Cage, and Laetitia Snow. Music manuscripts: John Cage, Allan Harlock, and Richard Herbert Howe. Tape editing: James Stroud. Computers: Illiac II, IBM 7094. Pressure-sensitive amplitude control: Rene Farley, National Research Board, Ottawa. Harpsichords loaned by: School of Music, University of Illinois · Mr. Waldemar Pollee, Benton Harbor, Michigan · Mr. Martin Rubinstein, Evanston · The Baldwin Piano Company, Cincinnati · The Baton Music Company, St. Louis · Mr. John Brueggeman, Cincinnati. Wollensak tape recorders courtesy of the 3M Company, St. Paul, Minnesota. Pre-amplifiers, microphones, and solophones courtesy of Shure Brothers, Evanston. HPSCHD published by Henmar Press of the C. F. Peters Corporation, New York City. Recorded version of HPSCHD with KNOBS program for listener playback control: Nonesuch Album (H-71224).

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## Image credits

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Slide projectors courtesy of Sawyer's Slide Projectors, GAF Corporation, New York City. White opaque polyethylene screens: Union Carbide Company. Films and slides: National Aeronautical and Space Administration · Mt. Palomar Astronomical Observatory · Museum of Modern Art, New York City · University of Illinois Visual Aids Service · Ronald Nameth · Robert Frerck · Robert Breer · John Whitney and Sons · Stan Van Der Beek · Lejaren Hiller · Antoinette Vischer. Streamers and smocks: Calvin Sumsion. Additional images obtained by I-Ching operations.

Program design: Calvin Sumsion. Type: Caslon Old Style with roman capitals and italic face. Paper: 80 lb. Shasta. Program cover design based on an image produced by Robert Frerck. Production: University of Illinois Press.

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## General credits

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Coordination: Jack McKenzie. Assembly Hall Management: Director: Thomas Parkinson. Assistant Director: Wayne Hecht. Publicity, Advertising: Herbert J. Dotten. Stage Manager: Jerry Nashlane. Box Office Manager: Glenn Crane.



Photograph of John Cage, Lejaren Hiller, and Morton Feldman, ca. 1980.  
*Photograph by Irene Haupt*

Program for 1980 performance of *HPSCHD* at Albright-Knox Art Gallery.



## HPSCHD

for Antoinette Vischer

Music: **John Cage and Lejaren Hiller (1967-69)**

Images (original slides): Ronald Nameth and Calvin Sumsion, NASA

## EVENINGS FOR NEW MUSIC - sixteenth season

### Music

Twenty-minute solos for one to seven amplified harpsichords and tapes for one to fifty-two amplified monaural machines to be used in whole or in any combination with or in part in any combination with or without interruptions, etc., to make an indeterminate concert of any agreed-upon length having two to fifty-nine channels with loud-speakers around the audience.

#### Solo I

Computer printout for 12-tone gamut

**David Tudor**  
Baldwin Solid Body Harpsichord

#### Solo II

Mozart Dicegame

**David Fuller**  
Dowd Double

#### Solo IV

Dicegame with Mozart compositions used as replacements, treble and bass independent

**Aki Takahashi**  
Herz Double

#### Solo V

Dicegame with historical sequence used as replacements, treble and bass linked

**Yvar Mikhashoff**  
Paul Teryl's Hand-build Harpsichord

#### Solo VI

Dicegame with historical sequence used as replacements, treble and bass independent

**Neely Bruce**  
Neupert Single

In addition to playing his own solo, each harpsichordist is free to practice or perform any Mozart composition, or to play any of the other solos. Monaural tapes give all divisions of the octave from five to fifty-six tones. At approximately 9:00 and 11:00 p.m., there will be a concert of all channels. The audience is free to move in and out of the performance space.

### MUSIC/SOUND CREDITS Computers: Illiac II, IBM 7094

**Sound system:** Unistage of Buffalo, SUNYAB Audio-Visual, Media Study/Buffalo, SUNYAB Department of Music. **Harpsichords** loaned by Paul Teryl, Buffalo Academy of the Visual and Performing Arts, Baldwin Keyboard, Kenmore, N.Y., SUNYAB Department of Music. **HPSCHD** published by Henmar Press of the C.F. Peters Corporation, New York City. **Technical director:** Joel Chadabe, Albany, N.Y., Center **technical assistant:** Ron Kuivila, Buffalo, N.Y., **technical recordist:** David Held, Buffalo, N.Y. **Sound assistants:** Stewart Werner, Albany, Michael Zak, John King, Mitch Robinson, Paul Gallagher, Charles Ames, Rick Kazmierczak, all Buffalo Recorded version of **HPSCHD** with **KNOBS** program for listener playback control: Nonesuch Album (H-71224).

### IMAGE CREDITS Projection screens: John Toth, Buffalo

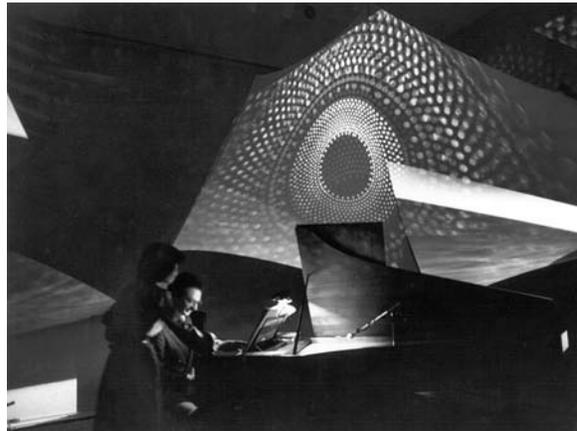
**Slide Projectors:** Eastman Kodak, Rochester, N.Y., SUNYAB Audio-Visual. **Film projectors:** Delaware A-V, SUNYAB Audio-Visual. **Dissolve units/stands:** Delaware A-V, Holland-Wegman, Buffalo. **Slides:** C.F. Peters, Lejaren Hiller, SUNYAB ECC. **Films:** Erie County Library Film Department, Buffalo Museum of Science Films, SUNYAB Media Library; NASA, Robert Breer, Paul Sharits, John Whitney, George Melles, Peter Kubelka, Norman McLaren, Lejaren Hiller. **Projection Director:** Tom Busch, Buffalo. **Projectionists:** Bruce Alesse, Richard Brown, Ray Bronisczewski, Robert Coggershall, Sylvano Colombano, Liz Grossman, Joe Gutt, Mandi Landa, Barbara Lantanzi, Marcelle Pecot, Chris Privateer, all Buffalo. **Photo reproduction:** M&W Photo Lab, Buffalo. **Invitation/logo design:** Violet Lee. **Program typography/layout:** Greg Schuler, Sara Hornbacher. **Photography:** Charles and Irene Haupt, Buffalo, David Beal, NYC. **Micro-computer program/display:** David Held, Sara Hornbacher. **Sign:** John Schweikard. **Projection stands:** Beck's Creamery, Blaisdell, N.Y.

### GENERAL CREDITS:

**The Center of the Creative and Performing Arts:** production coordinator for HPSCHD and managing director, Sara Hornbacher, **Artistic directors:** Morton Feldman, Jan Williams, **Research Consultant:** Lejaren Hiller, SUNYAB Department of Music: Dr. William Thomson, chairman. **Albright-Knox Gallery:** Robert T. Buck Jr., director; Douglas Schulz, curator; Serena Rattazi, public relations; John Kushner, technical arrangements. Special thanks for production support to: Alyssa Grossman, Center assistant, ArtServices of NYC; Mimi Johnson, Susan Szeliga, Lisa Mahoney, Baldwin, Keyboard of Kenmore: Mark Tarbell, Partner's Press, Kenmore, Dr. Gerald O'Grady, Center for Media Study/SUNYAB, T.J. Hargrave, Jack Hayes, Sheldon Holland, Bob Becker, Robert Lovejoy, Kenmore Builders: Jack Oles, Ryder Truck; Ned Evans, **Transportation coordination:** David Seman, **Hospitality:** Mr. and Mrs. Charles Banta, Sheldon Berlow, Buffalo.

These performances are made possible in part by grants from the National Endowment for the Arts, and the Slee Endowment.

Photographs of 1980 performance of *HPSCHD* at Albright-Knox Art Gallery.  
Yvar Mikhashoff playing harpsichord.  
*Photographs by Irene Haupt*



**Excerpt from Hiller interview with Vincent Plush, November 12, 1983.**

Hiller and Cage spent uncounted hours together working out the complex details of *HPSCHD*. Much of that time was spent in a trailer that Hiller used as a workshop in his backyard. Hiller and Cage may seem an unlikely pair of collaborators, but Hiller's description of their work together proves otherwise.

*"I must say, the ideas would flow back and forth. It was a very different collaboration, according to John, from what he did with Lou Harrison on Double Music, for example, in the sense that we did meet – I wouldn't say daily, because he was off with Merce Cunningham on tours now and then, and things of that sort, but frequently, and we would hash these ideas out together. The idea of actually using a musical dice game popped into my head one day, for example. I don't know – I said, "Well here's the obvious chance piece with which we start," and he loved the idea, you see? And then the I-Ching to make substitutions was his idea, and so on and so forth. It just seesawed back and forth. Most of the theatrical things later on he added to it, but again, he knew that I was more than sympathetic to that because of my own theatrical experience. He had seen some of my theater pieces, including *Avalanche*. He was at the premiere of that, and I think he was impressed with its humor, among other things. I would say this is one of the crucial things in a collaboration like that. I found with various people, particularly with a person with as strong a personality as John's, it would have been impossible if both of us didn't have a good sense of humor. That makes an enormous difference. Although we were and have been different in many ways in the way we write, we find a big degree of overlap in terms of – of humor, personality, and also, really our ideas are not that far different in many ways. It was a lucky coincidence, because it wouldn't have worked otherwise."*

Letter from John Cage to Lejaren and Elizabeth Hiller, 1967

HOW TO CUT SOMEONE IN HALF AND THEN PUT HIM BACK TOGETHER AGAIN.

1. Place subject on flat surface (floor or table).
2. Cover with sheet.
3. Simulate cutting subject into two parts.
4. Lift one end of sheet back to other end revealing one half of subject.
5. Replace sheet.
6. Repeat Step 4 revealing other half of subject.
7. Repeat Step 5.
8. Remove sheet showing subject to be undivided.

HOW TO MAKE OBJECTS APPEAR AND DISAPPEAR.

1. Cover yourself and objects with a sheet.
2. Place in front of you the object or objects you wish to make appear.
3. Bring sheet up, over and down behind object(s), so that they are visible.
4. Bring sheet up, over and down in front of object(s), so they are invisible.
5. Under cover, make any rearrangements (subtractions, substitutions, additions).
6. Repeat sequence 3-5 as many times as desired.
7. Come out from under.

for Jerry and Liz and family  
with love,

John, Christmas '67

(with background music)

## Vertical Cases and Wall Hanging

Fewer than 100 copies of each of the three *HPSCHD* posters were printed in 1969. The full-sized posters were so popular that they were stolen from bulletin boards and even from locked glass cases. The Music Library is grateful to David Eisenman for allowing the purchase of two of the three posters from him.

*HPSCHD poster #1 was conventional, featuring a Viskupic image of Cage (as dragonslayer). It is largely self-explanatory. Gary had previously produced similar large silk-screened posters for MUSICIRCUS. Notable is that Cage himself carefully applied a rubber stamp with the gaf corporation's logo to each copy of #1, in acknowledgment of gaf's generosity in lending dozens and dozens of slide projectors for the premiere. (Viskupic's design had already incorporated 3M's logo – 3M had agreed to provide enough Wollensak tape players for HPSCHD's electronic tapes.) Cage was tireless in seeking all sorts of support for his projects, and meticulous in finding ways to thank those who responded.*

--- David Eisenman, from *About the Artwork*, program notes to Electronic Music Foundation 2003 recording of *HPSCHD*.

*HPSCHD* poster no. 1



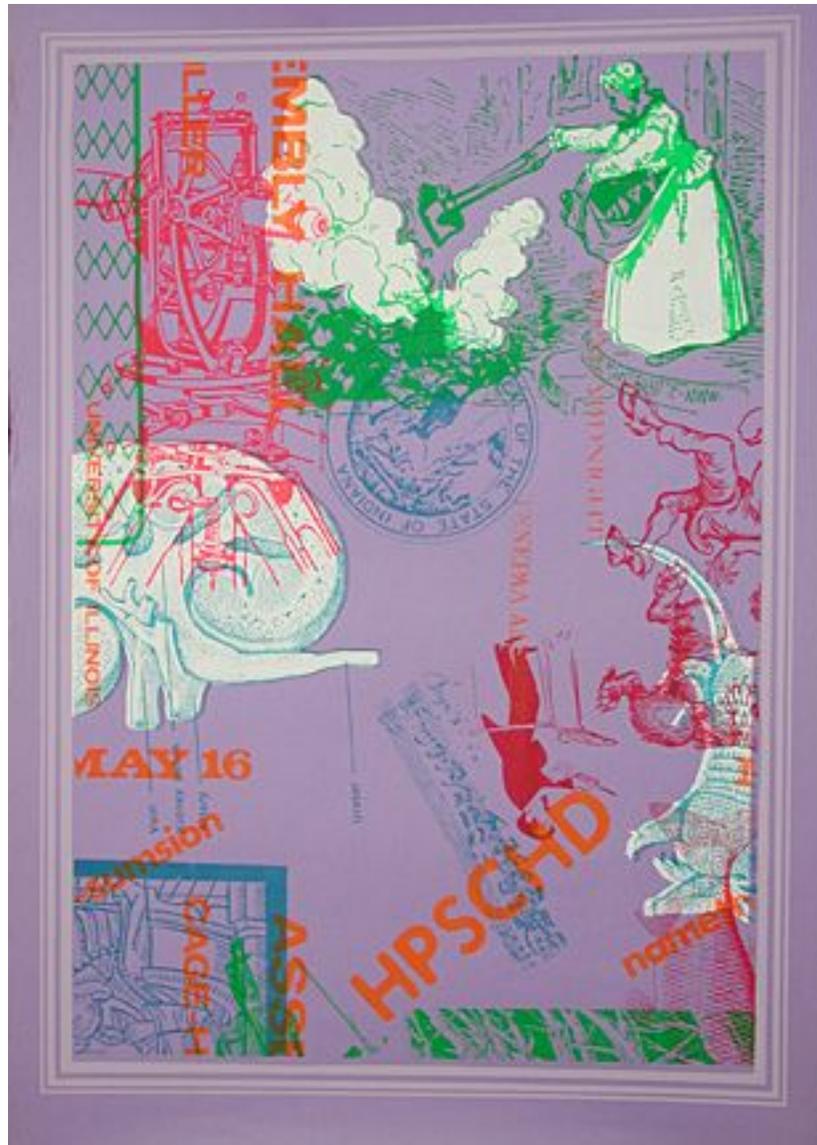
*Posters #2 and #3 were novel compositions, richly employing chance operations. Cage and Sumsion began by collecting images from here and there. They chose encyclopedia pages at random and copied whatever images appeared on them. They asked various friends and associates to name the first image that came to mind.*

*All these various images and design elements were arranged into 8 × 8 grids, from which elements were selected for the posters by I Ching operations. Cage and Sumsion next used further chance operations to determine the locations, sizes, orientations, and colors of each of the randomly-selected graphics.*

*The results delighted Cage. Entirely by chance appeared a mushroom, bars of music, and a conductor, in the midst of a pocket watch, a woman burning books, an armadillo, and the Seal of the State of Indiana – which for some reason particularly tickled him.*

--- David Eisenman, from *About the Artwork*, program notes to Electronic Music Foundation 2003 recording of *HPSCHD*.

*HPSCHD* poster no. 2



*HPSCHD* poster no. 3

Graciously loaned to the Music Library for this exhibition  
by Dr. David Fitzjarrald



Newspaper photograph taken at 1969 premiere of *HPSCHD* showing silk screen printing of smocks and other garments with the Beethoven/Cage design being distributed to the audience.



News-Gazette Photo by Donna Drysdale

**SILKSCREEN SMOCKS FOR HPSCHD CROWD**

• . . . So audience can glow with lighting effects



Silk-screened Tee-shirt courtesy of David Eisenman. Reproduction of design used at 1969 premiere of *HPSCHD*.

I-Ching chart used at 1969 premiere of *HPSCHD* to determine price of posters. *Courtesy of David Eisenman.*

	1	34	5	26	11	9	14	43
	25	51	3	27	24	42	21	17
	6	40	29	4	7	59	64	47
	33	62	39	52	15	53	56	31
	12	16	8	23	2	20	35	45
	44	32	48	18	46	57	50	28
	13	55	63	22	36	37	30	49
	10	54	60	41	19	61	38	58

Need from bottom up  
 lower trigram

6 times  
 → bottom up  
 Row 1st, column

Two 3 coins  
 Either 3 tails } straight line  
           2 head, 1 tail }  
           3 heads } broken line  
           2 tail, 1 head }

# x 3<sup>rd</sup> for single poster  
 # x 15<sup>th</sup> for set

Originally, Cage's new composition was planned for performance at the March 1968 concert celebrating the 100<sup>th</sup> anniversary of the University of Illinois. There is no way such a huge, free-form work could have been performed at such a formal, controlled event. Instead, the premiere took place May 16, 1969 at the University's Assembly Hall.

Telegram from John Cage notifying David Eisenman that his new composition for harpsichord will not be ready for March 1968 performance.

**NOTE-O-GRAM**  
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**JOHN CAGE**  
STONY POINT, NEW YORK 10980 • PHONE (A/C 914) 947-1161  
401 Edgebrook Drive 303, Champaign, Illinois 61820

MESSAGE	REPLY
<p>TO <span style="border: 1px solid black; padding: 2px;">Mr. David Eisenman 110 Student Services University of Illinois Urbana, Illinois 61801</span></p> <p>DATE Jan. 18, 1968</p> <p>The harpsichord piece will not be ready in time for March 11. It is possible that my Variations II will be performed by David Tudor. That will require electronic equipment, but I will give that information to Jack McKenzie and say that you have "contacts." I think I should be considered unavailable for the Teach-In-Across: I have performances in Buffalo March 8-10. As for the appearance of Mardi-Gras in the Univ., strikes me something in the air would help: planes flying in the midst of balloons seeing which one could burst the most!</p> <p style="text-align: center; color: red;"><i>Answer, John</i></p> <p>BY _____</p>	<p>DATE _____</p> <p>SIGNED _____</p>

INSTRUCTIONS TO SENDER: 1. KEEP YELLOW COPY. 2. SEND WHITE AND PINK COPIES WITH CARBON INTACT. INSTRUCTIONS TO RECEIVER: 1. WRITE REPLY. 2. DETACH STUB, KEEP PINK COPY, RETURN WHITE COPY TO SENDER.

**JOHN CAGE**  
STONY POINT, NEW YORK 10980

