Lejaren A. Hiller: Computer Music Pioneer

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.

I composed (1) for all types of traditional ensembles and instruments (chamber music, symphony orchestra, vocal groups, solo piano, etc.)

Also for theater, TV, cinema and multimedia.

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 to 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 written during.

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Principal Books:


2. Informationstheorie und Computermusik. Panstudiere Verlag, 1969, New York, Schott, etc., May 1, 1964

3. 40 Articles in music journals, magazines, record albums, etc. until 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.

Lejaren Hiller's first foray into computer music was his *String Quartet No. 4*, also known as *Illiac 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.


By 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 that this belongs to history. But he is very recent, and in any way I would like to have it myself.

I am still, however, with great pleasure, to prepare a piece of a pre-simultaneous composition, for 10 players, entitled 57/101, 08/262.

If you have not yet written a paper on this, 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 *G. B. L.?* If not,

Do you receive the *G. B. L.?* If not, do you receive the *G. B. L.?* If not, do you receive the *G. B. L.?* If not, please send me the letter, as a note and I'll send you the letter in a letter.

Best wishes, to you and your wife.

Yours,

Xenakis
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.
In addition to playing his own solo, each harpsichordist is free to play any of the others. Monaural tape giving all divisions of the octave from five to fifty-six tones performed by: Al Blatter - Morgan Powell - Dennis Kammu - James Knapp - James Fullerton - Mary Fullerton - Thomas Howell - Jon Bauman - James Stread - Dennis Eberhardt - Joe Sehos - Udo Kazemets - Clive Cohn - Peter Saleni and others. At approximately 5:30 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.

Music credits


Image credits


General credits


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 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."
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.

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 x 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.
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.

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.

Originally, Cage’s new composition was planned for performance at the March 1968 concert celebrating the 100th 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.
James Pritchett

HPSCHD

Music (not Composition) (1962-1969)

The work that closes this period in Cage’s career - HPSCHD for up to seven harpsichords and up to fifty-one tapes (1967-69) - presents an unusual case, a mixture of old-fashioned composition, multimedia event, and free-form circus. Composed at the request of the Swiss harpsichordist Antoinette Vischer, the piece was actually a collaboration between Cage and Lejaren Hiller, and these two facts - commission and collaboration - account for many of its seeming inconsistencies. Cage initially resisted the commission, not knowing how he could make the harpsichord an interesting medium. He decided to fulfill the commission only after he found an idea - the notion of a multiplicity of scales - that would bring the harpsichord into his contemporary world of abundance. Because of the short duration of harpsichord sounds, Cage felt the need for “an enrichment of the notion of scales . . . Necklaces of notes, or even rows of notes, and scales of notes, and modes of notes, and so forth: I would like to make a great multiplicity of such things. As he had in the 1945 A Book of Music, Cage identified this notion of the simultaneity of several different scales with the music of Mozart, in which diatonic and chromatic passages coexist with arpeggiation, and so forth.

At this point, Cage began his residency at the University of Illinois, where he was asked by Lejaren Hiller, a composer of computer music, to propose a project to be realized at their computer music studio. Cage responded to Hiller’s request with his ideas for the harpsichord commission, feeling that the work involved in generating music with a plurality of tunings and scales was well-suited to the computer. Having no computer skills, Cage relied on Hiller to do the programming for his project; soon Hiller began to have his own ideas about the piece, and so Cage suggested that they make it a collaborative effort. The title was derived from the name of a computer subroutine used in the program: in those days, the length of a subroutine name was limited to six upper-case letters, so that “harpsichord” was abbreviated to “HPSCHD”.

The use of different scales was to be realized within the do-