John Cage and LeJaren Hiller: HPSCHD, 1969

The University of Illinois at Urbana-Champaign celebrated its one hundredth anniversary in 1967, and numerous programs and concerts were scheduled to heighten the festivities. From among these, two New Music events were anticipated from then Visiting Associate in the Center for Advanced Studies, John Cage.

Cage had been invited by the university to compose music relating "chance procedures" and computer technology. In this connection Lejaren Hiller, head of the computer music facilities, requested two proposals from the composer, and Cage responded with an idea for a commissioned work, HPSCHD (computer abbreviation for harpsichord), and a piece titled Atlas Borealis with the Ten Thunderclaps.

The harpsichord work called for a program of microtonal sounds in which many divisions of the octave would be superimposed, "because that is something possible with the computer, but quite impossible otherwise." In his writings Cage frequently employs the term "useful," ". . . and so I thought of this as a 'useful' project in relation to the computer, because it made possible something that was otherwise very difficult. Then I was amazed at how slowly the work proceeded, it took the whole first year and into the summer before we had any output."[1] During that period HPSCHD acquired many features that both enlarged its sensory possibilities and elaborated upon the idea of sonic superimposition. It gradually evolved into a large intermedia environment held in the Assembly Hall at Urbana; an enormous theater-piece with fifty-two channel tape-orchestra, seven performing harpsichordists, and equally impressive visual resources and unique audience circumstances. All aspects of the event were meticulously and systematically randomized so that it was left to the spectators to fill in the space between sound and image with their random noises and movements.

Inasmuch as its parts were each assembled according to the laws of chance, HPSCHD can be thought of as a collage of superimposed layers of randomness.

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With this in mind, it may be useful to review Cage's non-Western philosophical position toward random events before peeling away layers from the first performance of May 1969.

> Around the 1950's, after studying the philosophy of Zen Buddhism with Diasetz Suzuki, I became interested in finding ways of composing that would free the music, free the sound from my memory and my likes and dislikes. You know, in Zen Buddhism everything causes everything else; one doesn't speak about causes and effects since one is in a network of causes and effects. In a situation where that's the case, and where also every being—whether sentient or nonsentient—is the "Buddha," we are completely free of hierarchy, of one being being more important than another. So this makes possible many things. The octave, then, has no more reason being divided into 5, 6, 7, 8, or 9 equal intervals than it has to be divided into 34, 43, or 56 parts, and it's just a question of establishing limits. I can't see the idea of superimposing all those various divisions of the octave [as I did in *HPSCHD*] arising in a structure influenced by our [Western] way of thinking. I can't find a reason for that in conventional European or Christian thinking—where it would have been much more natural to find out what would be the 'right' division of the octave, and then put the rest of them in Hell.[2]

During the early 1950s Christian Wolff had brought the *I-Ching (Book of Changes, or Written Book of Oracle and Wisdom)* to Cage's attention; the book offers oracles based on the result of six tosses of three coins. Sixty-four hexagrams accrue from the tosses, each of which acquired its own historical commentary through centuries of use. *I-Ching* was a reliable method of obtaining random numbers for the *Music of Changes* (1951-52), and Cage used it continually thereafter in his musical composition, writing of texts, and graphic determinations of lithos and etchings.

The first program that Cage undertook with the computer at Illinois was to derive hexagrams from the *I-Ching* in order to get random answers about microtonal gamuts, among other things, in *HPSCHD*. In the first operation the computer produced 6,000 hexagrams. Cage would have had to toss three coins 18,000 times to get the same result. This program pleased him so much that he told Hans Helms, "I now have many answers to questions I have not yet asked."[3] Thus, an important subroutine in the *HPSCHD* computer program came to be known as *ICHING*. The *ICHING* was applied to the choice of gamuts and other pitch details, and to the selection of interpolated musical materials in the solo parts. An *ICHING* printout was also used in randomizing the visual portions of *HPSCHD*. (See Figure 1.)

In addition to its value as a tool for obtaining random figures the *I-Ching* offered predictions about the future. At one point Cage tossed coins manually to ask the *I-Ching* what it thought of being subjected to computer technology. The enthusiastic commentary, attributed to Confucius, promised an abundant increase of benefits to culture; and a happy coincidence, too, since *HPSCHD* received its fullest

ORIGINAL HEXAGRAM

CHANGED HEXAGRAM

KEY FOR IDENTIFYING THE HEXAGRAM

| 17 | 29 | 42 | 64 | 41 | 39 | 62 | 63 | 21 | 32 | 36 | 40 | 58 | 1 |
| 49 | 8 | 42 | 40 | 24 | 39 | 8 | 3 | 38 | 16 | 34 | 45 | 47 | 1 |

Figure 1. Computer printout, ICHING hexagrams. Courtesy of John Cage.

performance in 1969. Cage said at the time, "I think the two most important things [in this] obviously changing and complex world are . . . to choose flexibility when one can, as opposed to fixity . . . and choose abundance rather than scarcity. Be wasteful rather than pinch-penny. Get as much as you can out of all there is to be had."[4] The hexagram indicated abundance, and that is exactly what the 1969 *HPSCHD* would have: abundance of sounds, people, visual effects, space, performers, divisions of the octave, and, in fact, overkill. From a programmatic standpoint, such abundance was perhaps possible only in growth years such as the late 1960s.

As with many other well-known figures in music composition, Cage had visited the Illinois campus several times before his appointment. New music had been encouraged over a twenty-year span by well-financed programs such as the Festivals of the Arts which became increasingly elaborate as the 1960s progressed. In 1953 Cage lectured and brought with him a series of magnetic tapes. Billed as the *First International Electronic Music Concert*, it included pieces by Stockhausen, Boulez, Eimert, Leuning, Ussachevsky, the entire French School of Electronic Music including Schaeffer and Henry. What was astonishing in this milieu was that the pieces were all brand new at the time. Composed in 1953 or the year before, and having had their premieres in Paris and New York, they were then heard in Ur-

bana.[5] "I took that [presentation] so seriously that instead of giving an 'interesting' lecture, as I had the previous year, I gave a 'serious-explanatory' lecture, and that was a great disappointment to the public."[6] Cage appeared several times thereafter in connection with the Merce Cunningham Dancers and as a lecturer-performer. When he arrived in 1967, "chance procedures" were widely known among educated composers, and his position as leader of the American avante garde was firmly established, especially as it related to the invention of the "musical happening."

His first major event at Illinois, called *MUSICIRCUS*, had no score, but consisted of simply inviting all those who would perform in the same time and space to do so. He was calling such events "reunions" in those days, a term subsequently applied to a single piece. "I hope to involve the public in this. I want the performers to be the public. My job is to facilitate their performance. The experiment will involve relationships of microphones to loudspeakers to get interesting results."[7]

Jack McKenzie headed the committee to choose a site. At first a local shopping center mall was selected, then some other locations were considered until it was finally decided that the University Stock Pavilion on the south side of the campus would be ideal. Constructed like a turn-of-the-century exhibition armory, the pavilion had tan-bark floor and had been used for showing livestock. It was a great place for people to mill about in because that is exactly what cattle did in it. And so, Friday evening, November 17, 1967, saw 5,000 participants moving about the pavilion, eager to experience *MUSICIRCUS*.

Cage's organization of *MUSICIRCUS* illustrated his essentially anarchical view of the world as a global village; the audience was in the round, and performers in between, around, and even above them. Cage said, "The audience must be in the round because we live in the round. . . . The audience can change its experience by where it moves; if you don't like what you're doing here, you can go there. Or you can leave altogether."[8]

Microphones were connected to the ventilating system by composers David Tudor and Gordon Mumma to insure a constant amplified roar throughout the evening. Above this the sounds of James Cuomo's local band competed with a Baroque orchestra playing, among other things, Bach's Fifth *Brandenburg Concerto* and against which Salvatore Martirano fired periodic heterodyne squeals from his electronic "feedback orchestra." Additional electronics were supplied by Lejaren Hiller. Jocy di Olivera and Richard O'Donnell performed Ben Johnston's *Knocking Piece* to the flashing of strobe-lights. Claude Kipnis, the mime-artist, did a pantomine of a person struggling against a wall of sound. Unintentionally, perhaps, others appeared to be doing mimes as well. Michael Udow was performing Morton Feldman's *The King of Denmark* at pianissimo, though one could only see Udow's slow subtle movements, since it was impossible to hear him. Cage's instructions to singer Norma Marder were brief: "I want you to enjoy yourself and sing my *Aria* as many times as you care to."[9]

A blackboard with special chalk had been placed at the door, so that when

visitors wrote on it their drawings glowed under the rays of blacklight. Many bal-
loons were strung across the pavilion, producing a carnivallike atmosphere. On
some of the large weather balloons a resident filmmaker, Ronald Nameth, was pro-
jecting rotating spirals and other variegations. The Merce Cunningham Dancers
were improvising dramatic movements that appeared as silhouettes on screens
across the pavilion.[10] Occasionally children would dart back and forth chasing
these shadows. A percussion platform designed by Barney Childs was set up in the
middle arena where percussion students improvised, and on which the audience
was invited to beat with anything they had, as loudly and violently as the inclina-
tion might carry them. If they could destroy it, so much the better.

Accounts of the general sound level vary. Ronald Nameth said, "MUSICIR-
CUS was great fun. As you moved around the great oval ring, you could hear so
many varieties of sounds merging into each other. If you stood in the middle of the
ring, you could hear all the sounds at once."[11] And the sound track of Nameth's
film titled MUSICIRCUS (sound track by Jaap Spek) confirms this sonic impres-
sion.[12] One participant walked up to Cage during the event, however, to complain
about the continuously loud roar. They discussed at it length, mouthing their
words; but without having understood each other they parted, each one satisfied
that he had communicated his meaning to the other.[13] Coordinator Jack McKenzie
said the sound level peaked beyond the threshold of pain at least twice during the
evening, and a review of the event bewailed its general disorder: "On and on went
the noise until one became so numbed with the overloading . . . that on leaving
the Pavilion the quiet, cold black night seemed to be the strange world."[14]

MUSICIRCUS had an intoxicating effect on those who attended, and the result
was an incredibly disorganized mob of people. As the night wore on (four hours
total), the cumulative effect on the audience was enormous. Composer Ben John-
ston explained that "once you were separated from your companion, it was fright-
ening. You couldn't see over the crowd, and you couldn't shout, because it didn't
do any good."[15] A couple of technicians were given the job of projecting spotlights
on the scene. As they focused on a particular happening, the crowd would try to
gravitate that way as if to find order amid the confusion—only to be frustratingly
deceived. A few people grabbed objects from the percussion stand and, wildly beat-
ing on them, ran through the crowds. One spectator noted the house lights going
on and off. As confused herd forced him by the control area of the pavilion,
he was surprised to see none other than Cage himself, pulling the master switch off
and on.

MUSICIRCUS was not merely a grand experiment in simultaneities but also a
challenging and provocative brand of the "musical happening." Advertised with a
poster showing a picture of Beethoven's face pasted on the cartoon body of a ballet
dancer, it had the remark, "You won't hear a thing. You'll hear everything." Many
of the participants of MUSICIRCUS who attended HPSCHD the following year ex-
pected a bigger and more violently energetic MUSICIRCUS. They were disap-
pointed, though, because Cage's intention was much different.

The next day at a symposium on the arts, along with guest composers Gunther Schuller and Charles Wourinen, Cage lectured on the nature of music and the University: "Art, instead of being an object made by one person, is a process set in motion by a group of people. It isn't someone saying something, but people doing things. Giving everyone, including those involved, the opportunity to have experiences they would not have had otherwise."[16]

There had been several "happenings" before *MUSICIRCUS* (e.g., *Woodstar*, 1965), and there would be others later (e.g., *Roy Murphy Intermedia Event*, 1967), so that by the time *HPSCHD* arrived in May 1969, the local audience was fully conditioned to the theatrical nature of such events.

Hiller was equally interested in theater. In 1958 he had been brought in from the chemistry department to establish the computer-music facilities, and illustrious achievements followed. With Leonard Isaacson he produced the now-famous *Illiac Suite*,[17] a computer-written string quartet, and subsequently published *Experimental Music*.[18] In addition to his work with computer music, Hiller was a pioneer in the conception of mixed media, especially in terms of the performance itself as a theatrical act.

Just before Cage's arrival at Illinois a performance of Hiller's *Suite for Two Pianos and Electronic Tape* was presented at Smith Music Hall. The *Suite* was a mixdown of elements from a larger work called *A Triptych for Hieronymous* and was inspired by the celebrated *Garden of Worldly Pleasures* by Hieronymous Bosch. There is an allusion to this in the score, where the word BSCH is spelled out in notation. Bosch's altarpiece is replete with iconography from the Last Judgment: grotesque animals, tortured souls, and bizarre juxtapositions of conventional forms. Hiller attempted to convey some of these baroques with harsh moments during which the piano soloists cry out barbarically. In its closing section the score reads, "Pound the keyboard senselessly and wildly— include clusters, glissandi, arpeggios . . . anything will do!"[19] Such programmatic conditions were not clear to some in attendance, and when the exciting finale concluded it moved one spectator to stage a dramatic scene—thereby adding yet another theatricalism to the evening's entertainment. Hiller said, "The violent assaults on the piano and the vocal howling of the last part, while not ordinarily appropriate to a concert program, are appropriate to *Hell*"[20] (the reference is to Bosch's painting).

Thus, it was not only their mutual interest in computer technology but also their mutual appreciation for theater, that made Hiller and Cage ideal partners in the elaborate *HPSCHD* project.

When Cage arrived in Urbana, the computer programmer with whom he had been expecting to work was already involved in another project, and so Hiller agreed to take up that aspect of the project himself. As Cage explained later, "Very shortly he was having his own ideas, and making a program. So I said, 'Why don't we make it a collaboration, because you're not simply programming?'"[21] A compositional dialogue followed in which the two composers' ideas freely intermingled. As *HPSCHD* progressed, they agreed that it would take place in a large open area, possibly a basketball court. There would be harpsichord soloists and audience

members would walk freely among the solo stands—surrounded by an orchestra of tape sounds.

Three computer programs evolved from their efforts: one for the solos called *DICEGAME*; one for the tape-orchestra called *HPSCHD*; and a third program called *KNOBS* for a projected recording of the music.[22]

The computer program *DICEGAME* that generated the material for the seven harpsichord solos was based on Mozart's *Musical Dice Game* (K. 294d/K. Anh. C 30.01). As Hiller explained, "John wanted the piece to be a homage to Mozart and to quote his music on the harpsichord. I suggested the *Dicegame* and he went along enthusiastically with the idea."[23] "The *Musical Dice Game* contains one hundred seventy-six pre-composed measures of music . . . arranged in two charts, eight numbers across and eleven numbers down. The first chart contains material for an A section of music, the second for a B section. By throwing dice eight times an eight measure [musical phrase can be composed], using the number rolled to indicate the appropriate horizontal and vertical lines on the chart."[24] (See Figure 2.)

The material is arranged in the charts in such a way that all compositional problems such as cadences are automatically adjusted and the compositional process is reduced to a game of throwing dice and matching measure numbers. By using repeat signs and a chart for the B material, a composition eighty measures in length is generated, having the form AABB aabb AB.

HPSCHD's DICEGAME, conditioned by *I-Ching*, presents a variant of the game just sixty-four measures long and lasting one minute. The *DICEGAME* is realized twenty times, or twenty minutes in length, and this forms the basic material for five of the seven harpsichord solo parts.

Harpsichord Solo II is nothing more than a single realization of this program: twenty passes of sixty-four measures each, where a dotted-half-note equals mm. 64.

Harpsichord Solo III follows the same plan with the exception that other compositions by Mozart replace the *DICEGAME* measures by a statistical process. Hiller said, "John went through one of the regular editions of the Mozart piano sonatas and used the *I-Ching* to choose which sonata and which movement. The passages so chosen were labelled 'Replacement Music I,' 'Replacement Music 2,' etc. . . . We set a limit of seven replacements so that we would end up with a fairly complete version of the terminal piece."[25] Each replacement music was rewritten in the new proportional notation of dotted half-note equals mm: 64. Thus, some mind-boggling notations appear in *HPSCHD* parts three through six, which are actually renotated versions of rather conventional music. Below is a list of Mozart replacements.

> Sonata in D Major, K. 284
>> Second Movement, first twenty-four measures
> Sonata in C Major, K. 330
>> First movement, first thirty-two measures
> Sonata in G Major, K. 283
>> First movement, first forty-seven measures

WOLFGANG AMADEUS MOZART

Musikalisches Würfelspiel

Table of Measure Numbers

Part One									Part Two							
	I	*II*	*III*	*IV*	*V*	*VI*	*VII*	*VIII*		*I*	*II*	*III*	*IV*	*V*	*VI*	*VII*	*VIII*
2	96	22	141	41	105	122	11	30	2	70	121	26	9	112	49	109	14
3	32	6	128	63	146	46	134	81	3	117	39	126	56	174	18	116	83
4	69	95	158	13	153	55	110	24	4	66	139	15	132	73	58	145	79
5	40	17	113	85	161	2	159	100	5	90	176	7	34	67	160	52	170
6	148	74	163	45	80	97	36	107	6	25	143	64	125	76	136	1	93
7	104	157	27	167	154	68	118	91	7	138	71	150	29	101	162	23	151
8	152	60	171	53	99	133	21	127	8	16	155	57	175	43	168	89	172
9	119	84	114	50	140	86	169	94	9	120	88	48	166	51	115	72	111
10	98	142	42	156	75	129	62	123	10	65	77	19	82	137	38	149	8
11	3	87	165	61	135	47	147	33	11	102	4	31	164	144	59	173	78
12	54	130	10	103	28	37	106	5	12	35	20	108	92	12	124	44	131

Table of Measures

Figure 2. Excerpt from Mozart, *Musical Dice Game* (K. 294d).

Fantasy in C Minor, K. 475
    First movement, first ten measures
Sonata in B♭ Major, K. 281
    Second movement, first thirty-two measures
Sonata in D Major, K. 284
    First movement, first thirty-two measures

Hiller said the replacements "provided a gradual but statistically controlled series of substitutions of one composition by another . . . [until] the original composition is erased and others take its place."[26]

Harpsichord Solo IV, paired with Solo III, is constructed along the same lines, except that replacements occur independently in the right- and left-hand parts. At certain points the performer must simultaneously play a different composition in each hand. Although space forbids large quotations from these scores, a typical example of the replacement process is illustrated in Solo III (mm. 157-58), where measure number twelve of the *DICEGAME* (m. 158) sits adjacent to a renoted version of measures thirteen of Mozart's *Sonata*, K. 330 (original notation is shown below the line; see Figure 3).

Figure 3. Excerpt from *HPSCHD* Solo III (mm. 157-58), with Mozart replacement shown beneath. © 1969, Henmare Press, by permission C. F. Peters Corp.

For the next pair of solos (V and VI), Hiller wanted to have replacements chosen from the general history of music. A span of time from Mozart to the present was divided into twenty-five-year periods and the following pieces were selected: *Appassionata* Sonata, L. V. Beethoven; Prelude in D Minor, opus 28, F. Chopin; "Reconaissance" from *Carnaval*, R. Schumann; *The Banjo*, L. Gottschalk; Sonatina no. 2, F. Busoni, *Winter music*, J. Cage; Sonata no. 5, L. Hiller.

"In all of this movement through history," Cage noted, "we've had, in some cases, to slightly change the music to fit into the five octave gamut which we limit ourselves to, so that the Chopin runs start up, but as they reach the limit of the gamut, we have them running back down the same way."[27]

The seventh harpsichord solo consists of simply one page and instructs the

performer to play any Mozart composition or any piece the other soloists happen to be playing.

Finally, Solo I, quite unlike all the other harpsichord parts, is a transcription of one of the tape-orchestra parts for twelve-tone gamut. Whereas the amplitude and registration are free in all the other solos, they are spelled out here in detail. Solo I is notated on a single staff with duration of notes indicated by actual space on the page (five inches equal to one second). (See Figure 4.) Since many dynamic changes are called for in a short time, the part is technically rather difficult to perform.
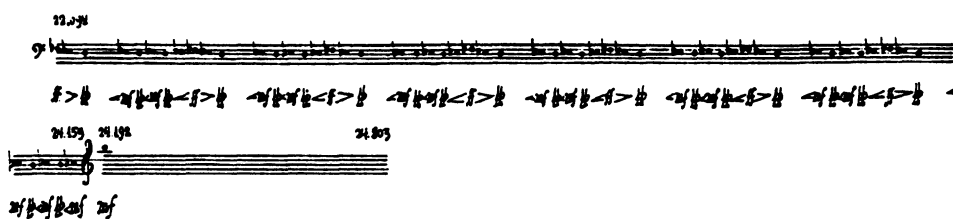

Figure 4. Excerpt from *HPSCHD* Solo I. © 1969, Henmare Press, by permission C. F. Peters Corp.

A second, rather complex program called *HPSCHD* was devised for the tape parts. It was this aspect of the composition that Cage had envisioned when he first came to Illinois. The tapes of the *HPSCHD* program consist of various sawtooth waveforms (the basic waveform of plucked strings and thus the closest thing to a harpsichordlike sound) rendered in a gamut of from 5 to 56 pitches. "For the *HPSCHD* program, Cage and Hiller, partly for acoustical reasons and partly for reasons dictated by available memory space in the IBM computer they used, divided the octave in all ways from 5 to 56. For each of these mathematically obtained pitches they gave a field of sharping or flatting by any of sixty-four *ICHING* determined degrees. This results in a potential reservoir for *HPSCHD* of approximately 885,000 pitches."[28]

There were five sections to the basic program labelled *GAMUT*, *DEVIA*, *DURAT*, *ICTUS*, and *TICTUS*, and nearly a dozen subroutines, of which we have already mentioned *ICHING*. Flow-charts are shown in *Source Magazine* and a detailed discussion of one segment of the program is explained by Hiller in an article titled "Programming the *I-Ching* Oracle."[29] Everything from pitch choices, inflection values, and time in milliseconds was weighed against goals in a scale, possible ornaments to be used, and dynamic levels. Illiac II generated sounds from the program information in three-minute increments that were later spliced together to form twenty-minute tapes.

Despite months of labor to design a suitable program, certain inevitable limitations of the computer became manifest. Having reached this point, Cage said,

"Rather than having a line of sounds which would go from one sound to the next, one could have a series of sounds which would overlap in various ways. . . . This would bring about complexities in programming which . . . seem excessive. And so the overlapping that will take place in this piece is the natural overlapping of one tape on another. . . . And yet it is this fact of sounds overlapping that was, in the case of fine harpsichord playing, productive of a musical experience. What is productive of a mechanical experience is the absence of overlapping."[30]

In this discussion of overlapping pitches, Cage revealed his underlying preference for collage technique at even the minutest level. He expressed this preference once again when speaking about the recorded version of HPSCHD: "I was very pleased with the superimposition of parts that made up the Nonesuch recording. It was so interesting piling up those [layers] on top of one another and see the piece go through what seemed like chamber music and then what seemed like orchestra music, and then evolve into something with which you are completely unfamiliar."[31]

Returning to the original plan for HPSCHD, Cage said, "The basic idea was to explore microtonality. Thus, the many scales, equal divisions of the octave, and so forth. Since the tonal material was therefore 'microscopic,' it seemed to me the graphic material should be 'telescopic.' "[32] These dualistic opposites "microscopic vs. telescopic," which account for the unusual range of subject matter in the 1969 HPSCHD, provided a unique subtheme for the first performance. "The setting chosen for HPSCHD, the University of Illinois Assembly Hall, was felt by both composers to be a unique theatrical space which up to that point had never been used to its full and characteristic potential. The immensity of the space suggested the use of multiple projections. The theme of these projections—stars, planets, travel through space—related not only to the size of the hall but, by complementarity to the finely microscopic use of pitch material in the music."[33] Since, then, the pitch materials delved into the world of microcollage, the visuals fittingly explored the world of macrocollage.

During his Illinois years Cage frequently visited at the home of Betty and Ben Johnston. Arriving on one occasion, he suddenly announced, "I believe, I've found just the person I'm looking for [for the HPSCHD graphics]. It's going to work, I know it."[34]

Cage had located graphic artist Calvin Sumsion, then a graduate student in the Illinois department of design, fully sympathetic to "chance procedures" and eager to develop visual counterparts for the music. Sumsion used the same ICHING printout for the selection of hard-graphics that Cage and Hiller had produced for the HPSCHD computer program.[35]

Aided by members of the Illinois art department, he chose primarily technographic photographs from two encyclopedias and placed them on a list of numbers from one to sixty-four. Their position, size, and relative superimposition was then subjected to ICHING. After converting some of the images to slides, they were

placed in slide trays with others and again subjected to *ICHING*—intended for
eventual projection onto a large circle of semitransparent plastic suspended from
the central rigging of the University Assembly Hall. A certain number was reserved
for projectors located in the lobby surrounding the building; the projectors were
aimed at the bay windows of the Assembly Hall, so that the slides would be visible
over the Illinois prairie during the expected four-hour evening performance.

Sumsion also commissioned a series of harmonograph drawings from Ronald
Resch that were positioned by *ICHING* determination on some Japanese-like ban-
ners for hanging above the central arena of the building.[36] About 4,000 smocks
were printed in flourescent-colored inks with the signs of the zodiac printed on
them—as a reference to the "telescopic" theme. Blacklight would pick out the audi-
ence members who wore them during the event, giving an added sense of involve-
ment and participation.[37] Finally Sumsion commissioned New York illustrator Gary
Viskupic to depict Cage in a poster mounting the three-headed dragon of Bach,
Beethoven, and Schumann, amid an array of electronic gadgetry.[38] (See Figure 5.)
Other posters displayed portions of photographs, fragments of text, and varieties
of colors overlayed in a dense *ICHING*-randomized collage. As in the slide-making
process, images were chosen from encyclopedias and placed on a list of numbers
from one to sixty-four—their position, size, and relative superimposition then sub-
jected to *ICHING*. An attractive color printout from this work, based entirely on
written text, appeared in *Art in America* as Cage's tribute to Marcel Duchamp.[39]

Sixty-eight hundred slides were obtained from various sources including
NASA, Mount Wilson Observatory, Palomar, and the Adler Planetarium. Some
learning resource photographs appeared among them as well; everything from
computer printouts to a picture of an armadillo was displayed. In addition, accord-
ing to Cage, "We made about 1,600 [hand-painted] slides. There were twenty-
six inks. There could have been a different number of inks, but that was Ron Na-
meth's repertoire. This included ones that float easily, ones that crystallize and
ones that were a little bit thicker. They were all different chemistries, so that they
interacted interestingly. We simply made a chart relating the twenty-six and sixty-
four and then, though the hexagrams, we were able to discover what inks to be
used. Then we divided the total number that we needed by 64 and found out how
many of each recipe and each *ICHING* determination of colors was needed, and
then we worked."[40] The handmade slides were divided by color into sixty-four
groups and then combined with the other slides—one hundred for each of eighty-
four projectors, or 8,400 in all.

In keeping with the spirit of "abundance," Cage did not want a single slide to
be repeated in the entire evening of *HPSCHD*. Thus, he enlisted the help of many
people in the slide-making process. One person remembers that Cage always
seemed to be carrying a slidebox with him, and, as Nameth reported, "During the
last days we were still painting away, and a bit rushed to complete all 8,400 slides.
Everyone joined in when they could. Merce Cunningham came in [on a flight from

Figure 5. Poster from *HPSCHD*, 1969. Courtesy of Tom McGeary.

New York] and—arriving late, he sat down and started painting too.—All the while discussing his adventures on the journey, which had us laughing at his humorous anecdotes. Finally, we had all the slides ready.[41]

Nameth was the fourth and final principal in the *HPSCHD* extravagenza. He had distinguished himself at Illinois through his associations with Salvatore Martirano in a piece called *L's G A* (Lincoln's Gettysburg Address) for gas-masked politico, electronic tape, and film projections, and exciting theater-piece with many characteristic late 1960s motifs.[42]

"In making the selection of the films, we decided to use films of 'outer space' in constrast to the music's introspection into microtones. These films not only revealed outer space, as we know it scientifically, but also revealed space from a metaphysical viewpoint—and showed mankind's conception and experience of space subjectivity and intuitively. There were films on Stonehenge and other ancient sites from around the world, which revealed the earth's long-standing contact with the universe. In addition, we showed some of the earliest films concerning man's understanding of space, including Méliè's *Trip to the Moon* [loaned by the Museum of Modern Art, New York City], one of the first films ever made."[43]

Nameth previewed some 400 films from the Illinois Film Service catalog and chose a group of primarily scientific reels.

> We also had some of the latest examples of experimental and computer films, among them John Whitney's computer-graphic films. In addition, I had prepared quite a lot of electronically generated film material exploring space as energy . . . film segments made electronically through synthesis, put up on a scope, and then filmed with color filters. One long film called *Traces* was of this material. Other visual segments were made by optical printing, superimposing realistic material in various symmetrical arrangements. One segment showed a face turning 360 degrees, from left to right, and the same face turning again from right to left. Using the *ICHING*, films were placed in random relationships, and as one film was completed, another would replace it.[44]

Finding suitable projection surfaces for the visuals posed a major problem. After experimenting with materials of various densities, it was decided that images would be projected through eleven parallel screens made of transparent plastic. Images were intended to fade away step by step through this grid of screens. Surrounding them was a gigantic circular veil (also of translucent plastic) 340 feet in circumference, onto which thousands of slides, photos, and hand-painted images were projected. The theme of these images was said to describe yet another program: the history of man from his primitive beginnings up to modern times. The idea ran parallel to the history of music sequence in the solo parts.

HPSCHD was to take place in the enormous planetarium-shaped structure of the Assembly Hall, a huge circular building with radial aisles and concentric promenades that seats nearly 17,000 people. "Assembly Hall was planned and constructed as a sports arena . . . [but] also used for musical events. . . . The enclosed

area is enormous. The distance from floor to ceiling is staggering and musical sounds, even those produced by a large orchestra, become lost in all the space, even if they are amplified. Cage was intrigued with the challenge of filling such a huge unsympathetic space with sound."[45] The building has a curious muting effect not only because of its enormity but also because sound waves disperse so rapidly over its gradually sloping contours. This defies the great expectation for echo that a visitor might anticipate from such a simple, techtonic form. Both the shape and acoustics of Assembly Hall were ideal for the theatrics anticipated from *HPSCHD*.

As the climactic day approached, all the material—208 tapes, 84 slide projectors, 52 tape recorders, 52 speakers, 12 movie projectors, amplifiers, plastic-screens, slides, films, posters, and no one could now tell what other paraphernalia—was readied for delivery to the Assembly Hall. Seven harpsichords were rounded up from four different states. The large 340-foot plastic screen was erected a few days in advance, along with rows of slide projectors. Tape recorders, slide projectors, and 16-mm projectors were brought in on loan. Fifty-two speakers were salvaged, most of them from the football stadium, and it took work crews an entire day to mount them high up in the perimeter of the dome. Parallel plastic screens were attached to the central rigging, adjusted for hanging to forty-five feet, and raised just high enough off the floor so that participants could not reach them by standing on one another's shoulders. Blacklights were added to the various ranks of colored lights, and a mirror ball, similar to those seen in discotheques, was placed to the side of the rigging. A piercing, narrow spotlight reflecting off this sprayed patches of light across the ceiling. After the electronics were installed, a maximum volume check was made of all stations to insure that the sound level would never peak into the level of pain as it had done in *MUSICIRCUS*.[46]

Tempting as it may be to give further details about these preparations, this study must, in order not to sprawl on indefinitely, concentrate on the performance itself. Suffice it to say that Cage expended much effort in the final stages of *HPSCHD*, attempting to locate harpsichords, harpsichordists, and so forth. By a freak accident he even had to re-ink hundreds of pages in the solo parts because a copyist had failed to write darkly enough on the special transparent paper. "The experience of making *HPSCHD* was so time and energy consuming that I have since steered clear of institutions and the use of comparable technology."[47]

At 7:30 on the warm, humid evening in May, Jack McKenzie gave the order to commence, and a trickle of microtonal electronics began to emanate from the fifty-two speakers. The seven soloists began their performances, and continuously changing displays took shape on the enormous screens above. The final layer of the collage was added as the people entered the Assembly Hall, and the performance began (Figure 6).

"It reminded me of an auto show," an innocent spectator later reported. "There were many stations around, selling their wares of sights and sounds." Some participants wandered from station to station, while others simply milled about. To one side posters were being silk-screened, and also paper smocks and T-
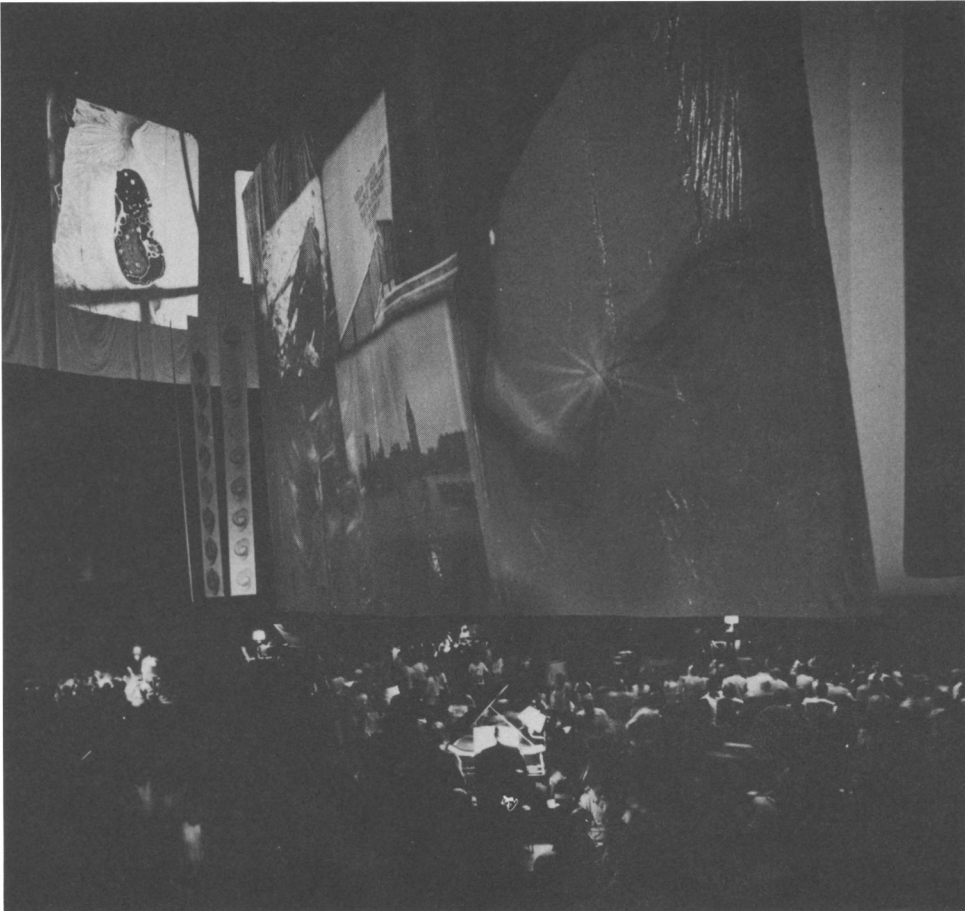
Figure 6. *HPSCHD*, 1969. Courtesy of Thomas Parkinson.

shirts (even long underwear) with zodiac images. In the central arena many people were lying down, looking at the visual spectacle above them. Conversation was relatively muted, though the voices of participants could be clearly heard above the music whenever it seemed necessary for them to be heard.

Cage instructed a technician to change the lighting whenever it suited him. Now and then blacklights came on and set the *HPSCHD* banners and smocks to glow. Nameth decided that the light from the projectors was not sufficient to illuminate the interior and so went to the control panel and slowly turned on a soft blue light that came from the center of the domed ceiling and spread itself down all the sides. That thrilling visual effect is seen in a color photo of *HPSCHD* appearing in the November 1970 issue of *National Geographic Magazine*.[48]

Seven soloists were seated at harpsichords on raised stands, each with its own old-fashioned floor lamp. Composer David Tudor played Solo I, a transcription of the twelve-tone version of the *HPSCHD* program. He was able to modify the sound
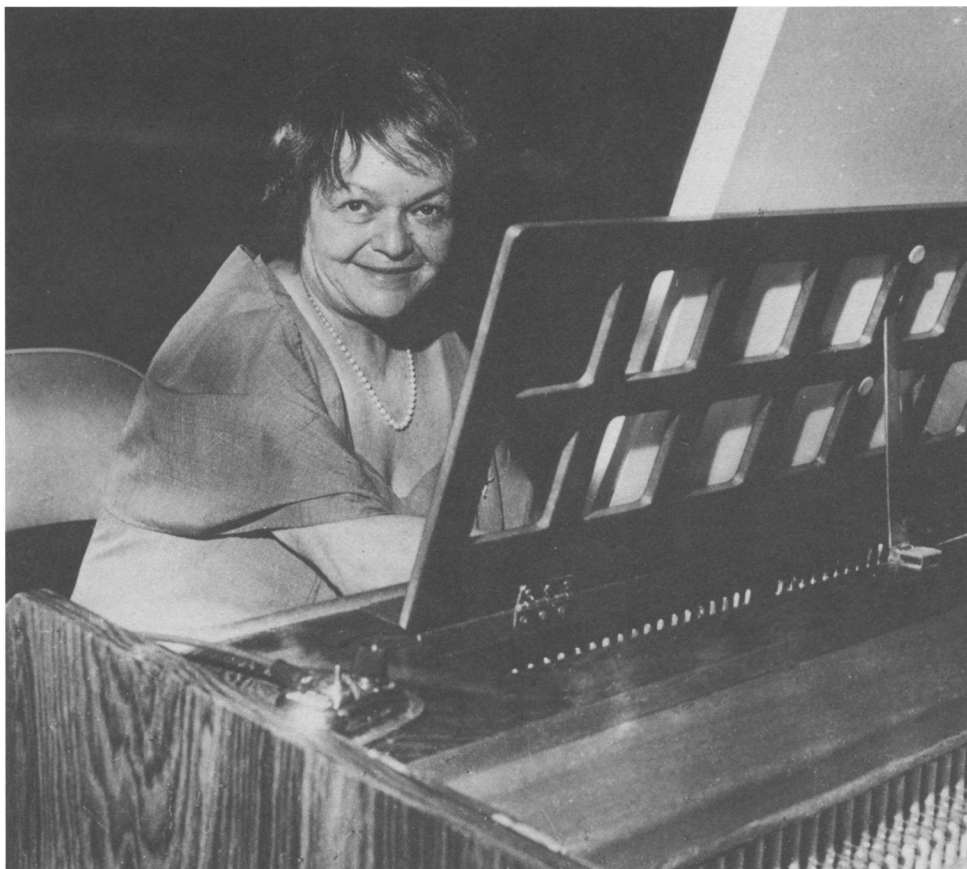
Figure 7. Antoinette Vischer, the Swiss harpsichordist who commissioned *HPSCHD*, seated at her instrument during the 1969 performance.

quality called for in the score with a device designed by Hugh LeCaine, permitting many amplitude changes per second. Antoinette Vischer (Figure 7), the Swiss harpsichordist who commissioned *HPSCHD*, played Solo II, a computer-arranged version of the Mozart *MUSICAL DICE GAME*. William Brooks and Ronald Peters played the *DICEGAME* with a set of Mozart replacements (Solos III and IV), and Yuji Takahashi and Neely Bruce played the *DICEGAME* with the historical sequence as replacements (Solos V and VI). Finally, Philip Corner, free to perform a Mozart piece of his choice or anything else, spent most of his time playing a one-note solo, which is very much like his own minimalist music.

Four sets of tapes for each of the fifty-two channels were spread among thirteen stations, with the instructions that they were all to be played about twice during the evening.

As soloist Bill Brooks put it, "A festive air pervaded the performance [which is] a consequence of the piece . . . Not only do all the tape sounds have a remarkable

homogeneity, but they all intersect with the live music both timbrally, structurally—based as they are on repetition—and physically (Solo I is a tape part). Moreover, the live materials are overwhelmingly dominated by the *DICEGAME:* this means that *HPSCHD* is above all a drone on C major and triple (minuet) time. I think much of its festive air is a consequence of the constant cheery C major, the insistence of the *DICEGAME* music on triviality and the danceability of the rhythm."[49]

HPSCHD was a unique brand of the twentieth-century concerto, a concerto-in-the-round and for all the senses. Solos and tape-orchestra were given aural and spatial prominence, but not so much that spectators could not have equalled them by the intensity of their speech and actions. The participants were a true extension of the piece itself, because—in their random sounds and actions—they reflected yet another layer in the collage. Unlike *MUSICIRCUS, HPSCHD* projected clear goals, so that its audience displayed far more social coherence. The event was held in a building used for official gatherings (and it was not a livestock pavilion), with sound levels carefully checked in advance so that sounds would never get too loud. It was even advertised with straightforward, technographic posters to an audience that respected technology (the U.S. would land a man on the moon in less than two months), and anticipated new aesthetic possibilities from computer-assisted music. Cage said, "I think *HPSCHD* was more like a work of art than *MUSICIRCUS.* . . . The reason I say this is because all the parts were made for each other."[50]

New York *Times* critic Richard Kostelanetz gave an account of the performance:

> The scene was bathed in a sea of sounds, which had no distinct relation to each other—an atonal and structural chaos so continually in flux that one could hear nothing more specific than a few seconds of repetition. . . . Most of the audience milled about the floor while hundreds took seats in the bleachers. All over the place were people, some of them supine, their eyes closed, grooving in the multiple stereophony. A few people at times broke into a dance, creating a show within a show that simply added more to the mix. Some painted their faces with Dayglo colors, while, off on the side, several students had a process for implanting on white shirts a red picture of Beethoven wearing a sweatshirt emblazoned with John Cage's smiling face. . . . While co-composer Hiller officiously checked on the machinery and its upkeep—though it scarcely mattered artistically if a few channels were lost—John Cage glided around the hall beaming beatifically.[51]

At one point he turned to Tom Parkinson, director of the Assembly Hall, and said, "Something important is happening here tonight."

A snake dance formed in the central arena, and from a distance it added interesting convoluted motions to the visual display. While the random conversation of people had become an extension of the sound, the random nature of their movements had become an extension of the visuals. Each thing had settled into its own place in the natural disorder.

As one participant said at the time, "The first half-hour, I felt quite confused. I could detect no goal, purpose or objective. I saw no logical arrangement of subject matter or sound which held my attention. I failed to see any relationship among the various types of presentations. Toward the end of the evening I came to the realization that the whole seemingly confused affair, probably had much in common with the world around us, and, in fact, could have been a simulated model of it. After this became clear, I felt a purpose in my being there."[52]

In both concept and location, *HPSCHD* was analogous to a cosmic diagram. Cage had taken a small section of the universe and shown its random relation to the rest. Each layer of the event was supercharged with abundance: an abundance of sounds, people, visuals, events; and each layer had been meticulously disorganized to set it apart from the others, while at the same time retaining a strict family connection—all of this distributed over a sloping grid of radiating aisles and concentric promenades.

"As the evening wore on, formally dressed couples from fraternity dances began to mingle with the mini-skirts and bell-bottoms. In the area beneath the screens a play group formed. Paper wad snowballs were tossed back and forth."[53] Just after midnight, the mix ran down into silence, the house lights turned on, and the elated participants drifted out.

Nearly 7,000 people attended that single performance of *HPSCHD*, and each one had made his own music that evening, music-making that continued beyond the boundaries of the event. Whereas *MUSICIRCUS* could be labeled a grand experiment, *HPSCHD* was a demonstrated artistic affirmation. A Barnum-and-Bailey-style concert of the electronic music world, it required the best efforts of scores of people, only forty of whom were listed on the original program. That it was intended to be presented in that particular format only once, and that so much effort went into its production, is a testimonal to the artistic energy present during the late 1960s.

At the celebration party afterward, performers, guests, and celebrities were excited and gesticulating. Jaap Spek casually walked about recording individual conversations, while secret microphones simultaneously recorded others. From out of the mix an unmistakably familiar voiced asked: "It went well, don't you think?"[54]

Cage had predicted in *Silence* that musical culture was moving toward theater: "Relevant action is theatrical (music—imaginary separation of hearing from the other senses—does not exist), inclusive and intentionally purposeless. Theater is continually becoming that it is becoming; each human being is at the best point for reception."[55] *HPSCHD* has become the cultural evidence for this artistic pronouncement.

A camera crew had been filming the entire production in accordance with Cage's ideas and principles: random shooting, choice of filters, shooting at prearranged clock-times. When the print was done, again according to various randomizing selections, it was brought to a New York studio for matching with the sound

track. Incredibly, an unrelated fire in the studio one evening destroyed the entire film of *HPSCHD*. Nothing was left of it, not even the metal cans and splicing tools could be found.[56]

Of course, other performances were given in the following years: one in Albany, at the State University of New York (organized by Joel Chadabe); one at the Roundhouse, London; another at the Berlin Philharmonie; they continue today. Subsequent *HPSCHD*'s, however, have been adapted to the needs of new audiences in different places, and, by comparison with the 1969 version, they are much less full performances. Cage had often said during his Illinois years that there was "unrecognized abundance" around. us. The 1969 *HPSCHD* came at a time and place when it was possible to demonstrate the theme of "abundance" to its fullest. "Who would believe," [Kostelanetz concluded], that before John Cage arrived, Urbana's Assembly Hall itself could be turned into a work of art? . . . In the future, let *HPSCHD* turn on even larger spaces, like Madison Square Garden, the Astrodome, or even the Buckminster Fuller dome that someday ought to be constructed over Mid-town Manhattan. Wish you were, or could be, there."[57]

NOTES

I would like to thank John Cage for granting three interviews regarding *HPSCHD* at Notre Dame University, 1980, and for unfailing cooperation in supplying data, sources, and explanations. Special thanks are also due to Betty and Ben Johnston, who made available source materials, opened channels of communication, and provided a historical overview of John Cage's Illinois years. Finally, thanks are due to Lejaren Hiller, Ronald Nameth, Jack McKenzie, Thomas Parkinson, Norma Marder, Thomas Kovacs, and William Brooks for documents, letters, and interviews.

1. John Cage, interviews, Mar. 12-13, 1980, Notre Dame University, Notre Dame, Ind. Tape and transcript are in the author's collection. Unless otherwise indicated, all interviews were conducted by the author.

2. Ibid.

3. A tape entitled *John Cage Talking to Hans G. Helms on Music and Politics* (Washington: Black Box Recordings, 1975).

4. John Cage, "Choosing Abundance," *North American Review*, 254 (Fall 1969), 10.

5. Ben Johnston, interview, Mar. 24, 1979, Urbana, Ill. Tape and transcript are in the author's collection.

6. Cage interviews.

7. Patricia Sibbert, "Presenting John Cage's Electric Music Machine," Champaign-Urbana *Courier*, Sept. 29, 1967, p. 21.

8. Steve Yahn, "John Cage, a Mixed Bag," *Focus on the Arts at Illinois*, 1 (Nov. 1976), 1.

9. Norma Marder, interview, Dec. 29, 1979, Champaign, Ill. Tape and transcript are in the author's collection.

10. John Cage, *MUSICIRCUS* [photographs by Thomas Kovacs Nov. 17, 1967], slide-copies in author's collection.

11. Letter of Ronald Nameth, July 27, 1980, copy in author's collection.

12. Ronald Nameth, *MUSICIRCUS* [sound track by Jaap Spek] (San Francisco: Canyon Cinema, 1967).

13. Johnston interview.

14. Larry Finley, "What Happened at the Happening," Champaign-Urbana *Courier*, Nov. 19, 1967, p. 20.

15. Johnston interview.

16. John Cage, "Music and the University. What kind? What aim?" *Symposium on the Arts* [recorded by D. Eisenmann, Nov. 18, 1967] University Archives, University of Illinois, Urbana-Champaign.

17. Lejaren Hiller, *Illiac Suite for String*

Quartet (New York: Theodore Presser, 1957).

18. Lejaren Hiller and Leonard Isaacson, *Experimental Music* (New York: McGraw-Hill, 1959).

19. Lejaren Hiller, *Suite for Two Pianos and Tape* (New York: Theodore Presser, 1966).

20. Lejaren Hiller, *Avalanche/Nightmare Music/Suite for Two Pianos and Tape*, Heliodor Records 2549 006.

21. Cage interviews.

22. John Cage and Lejaren Hiller, *HPSCHD*, and Ben Johnston, *String Quartet No. 2*, Nonesuch Records H-71224.

23. Letter of Lejaren Hiller, Nov. 17, 1980, copy in author's collection.

24. William Duckworth, "Expanding Notational Parameters in the Music of John Cage" (Ph.D. diss., University of Illinois, 1972), pp. 127-28.

25. Larry Austin, "John Cage and Lejaren Hiller, HPSCHD," *Source-Music on the Avante Garde*, 2 (July 1968), 11-19.

26. Ibid., p. 15.

27. Ibid., p. 12.

28. "Decade of Computer Music Study Culminating in HPSCHD," Champaign-Urbana *Courier*, May 15, 1969, p. 8.

29. Lejaren Hiller, "Programming the I-Ching Oracle," *Computer Studies in the Humanities and Verbal Behavior*, 3 (1970), 130-43.

30. Austin, "Cage and Hiller," p. 12.

31. Cage interviews.

32. Ibid.

33. "Decade of Computer Music Study."

34. Johnston interview.

35. Calvin Sumsion, "The Integration of Visual Elements by I-Ching Philosophy and Gestalt Psychology" (M.A. thesis, University of Illinois, 1969), p. 4.

36. Ibid., p. 9.

37. Ibid., p. 33.

38. Ibid., p. 10.

39. John Cage and Calvin Sumsion, *Art in America*, 57 (July-Aug. 1969), 33-34.

40. Sumsion, "Integration of Visual Elements," pp. 8-9.

41. Letter of Ronald Nameth, Jan. 6, 1980, copy in author's collection.

42. Salvatore Martirano, *L's G A*, Polydor Records 24-5001.

43. Nameth letter of Jan. 6, 1980.

44. Ibid.

45. Charles Hamm, "Changing Patterns in Society and Music," *Contemporary Music and Music Cultures* (Englewood Cliffs, N.J.: Prentice Hall, 1975).

46. Jack McKenzie, interview, Mar. 27, 1979, Urbana, Ill. Tape and transcript are in the author's collection.

47. Cage interviews.

48. Peter T. White, "Behold the Computer," *National Geographic Magazine* [photographs by Bruce Dale], 138 (Nov. 1970), 628-29.

49. Letter of William Brooks, Sept. 6, 1979, copy in author's collection.

50. Cage interviews.

51. Richard Kostelanetz, *John Cage* (New York: Praeger Publishers, 1970), pp. 173-74.

52. Sumsion, "Integration of Visual Elements," p. 43.

53. Thomas Willis, "Urbana Happening in Solar Setting," Chicago *Tribune*, May 18, 1969, p. 8.

54. John Cage and Lejaren Hiller, "*HPSCHD* celebration party" [recorded by Ben Johnston and Jaap Spek, May 16, 1969]. Copy in author's collection.

55. John Cage, *Silence* (Middletown, Conn.: Wesleyan University Press, 1961), p. 14.

56. Letter of Andrew Norman, correspondence, Mar. 19, 1979, copy in author's collection.

57Kostelanetz, *John Cage*, p. 177.