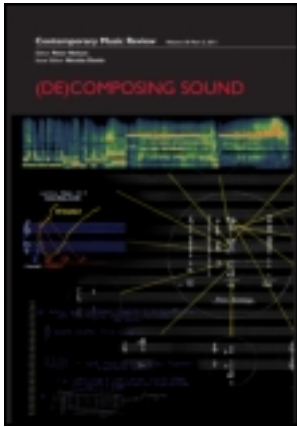


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In re: 'Experimental Music'

William Brooks

John Cage is universally associated with the phrase experimental music. But what did that phrase mean, for Cage and for Cage's predecessors? I begin with Cage and Lejaren Hiller, both writing important texts on 'experimental music' in 1959. From there, I trace the phrase backwards, eventually reaching Émile Zola, Gertrude Stein, and William James. A final section traces the phrase forward to Cage and Hiller's collaboration on HPSCHD (1969).

Keywords: John Cage; Lejaren Hiller; Experimental music

It was 1958.¹ In Urbana, Illinois, Lejaren Hiller was preparing a report on his compositional work with the ILLIAC computer. It would appear in 1959 as a book, *Experimental Music* (Hiller & Isaacson, 1959). In New York, John Cage was writing a new text in the wake of his recent appearance at Darmstadt. It would appear in 1959 as an article entitled 'History of Experimental Music in the United States' (Cage, 1959 [1961]). In Europe, Célestin Deliège and others had begun assembling the components for a special issue of *Revue Belge de Musicologie*. It would appear in 1959 under the title 'Musique Experimentale', with articles on the topic by Boulez, Stockhausen, Pousseur, Ussachevsky, and others (Deliège, 1959). In 1959, clearly, *experimental music* was a phrase whose time had come.

But not all who used it meant the same thing. Hiller and Cage, in particular, used it almost in opposition. Yet a decade later, in 1969, they had come together for a monumental collaboration, *HPSCHD*. How did this happen? How did they begin from such different positions, and how did they achieve agreement? What was the pre-history of 'experimental music' before 1959, and what happened in the 1960s to permit the phrase to be employed in concord by two such very different composers?

The sources of the phrase are to be found in other arts in the early part of the century. And cultural and technological developments in the 1960s allowed it to become something different than it had been. But I want to begin with the

difference between Cage and Hiller in 1959. And to elucidate that I offer a metaphor.

Picture me on my bicycle. I'm riding home by my usual route. There's a road that angles off to the right. I ask myself, 'I wonder if this is a faster route?' I take it; I arrive home later than usual. It is *not* a faster route. Now picture me arriving at the juncture and asking, 'I wonder where this goes?' I take it; it turns out that it goes past a pub, a sports field, a small wood, and much more, before returning to the main road. I cycle home, remembering.

In both cases, arriving home, I explain to my son that I 'tried an experiment'. But I continue the conversation differently. In the first case, I say that the route is slower. In the second case, I describe what I saw. The first answer is quantitative; the second, qualitative. For my son, the answers are pragmatically different. From the first, he knows not to take the road if he wants to get home quickly, but he's learned nothing about why one might *choose* to take the road. From the second, he learns quite a bit about choices but very little about value; he knows where the woods can be found, but he knows very little about the route's advantages or disadvantages. Though I might describe both adventures as 'experiments', they are actually quite different. In the first, I test a hypothesis; in the second, I simply observe.

There are fundamental differences between *test* and *observation*. A *test* is associated with questions of a certain form: 'Is it the case that X is true?' If we wish to be scientific, we change the question to a proposition: 'Let X be true'. And we draw an inference: 'In the presence of X, Y will occur'. On the basis of this we devise an experiment that allows us to determine whether Y is indeed present. If it is not, then X is not the case; if it is, X *might* be the case. Science is characterized by negative proofs; only demonstrations of falsity are conclusive. But every test that does not produce a negative strengthens our inclination to assert X, again and again. We can't say conclusively that X is true; but we act that way.² And, colloquially, we offer one of two answers to our initial question: yes, I think X is true (and I will act on that); no, X is not true (and that's for certain).

Now consider *observation*. This too is associated with questions of a certain form: 'What happens if X?' But we draw no inferences in this case; we merely observe the results. The results are multiple, and none of them are 'yes' or 'no'. ('What happens if X?' 'Yes'. 'Eh?') The falsity of X cannot be established by our observations; nor are we inclined to assume truthfulness. We do make associations; we will form an indefinitely large number of statements of the form 'I noticed that in the presence of X, Y occurred'. But these are *a posteriori*; we have no foreknowledge of Y, and (wishing to bear true witness) we endeavor to make no assumptions. We might, on the basis of our observations, attempt to determine whether a particular inference—'in the presence of X, Y will occur'—is false. But then we have moved on to a *test*, and *observation* has ended.

Let me get back on my bicycle. In the first case, I hypothesize that the new route will have a certain property: it will be faster. The road, in effect, becomes a laboratory; I test my hypothesis. I am a scientist. In the second case, I hypothesize nothing; I ask an open question: what *are* the properties of the new route? Where does it go; what will I see? The road is more like a playground than a laboratory. In the first case, there are only two outcomes: faster or not faster. I make a judgment, a guide to future action, based on the result. In the second case, there are indefinite number of outcomes. I withhold judgment so that I can make discoveries.

With *test*, we tend to associate design; with *observation*, invention. Tests are useful in ensuring consistency and reproduction; observation engenders diversity and variation. Tests lead to accomplishment, allowing us to act with certainty; observation leads at most to aspiration, to the resolution to embrace uncertainty in the hope of gaining something—exactly what, is unknown.

In 1958, Hiller was reporting on a series of tests. Cage proposed that we should simply observe. Both claimed the word ‘experiment’; both rode similar compositional bicycles; both took new routes. But what they did was fundamentally different. Hiller had proposed a hypothesis: ‘[W]e have carried out a series of experiments’, he writes, ‘to determine whether automatic high-speed computers . . . can be used to generate music subject only to general instructions derived from various specified “rules” of composition’, (Hiller & Isaacson, 1959, p. 2). He embarked on a series of tests, based on what was called the ‘Monte Carlo method’, in which random numbers generated outputs in large quantities, each of which was assessed:

We were able to act on this proposition by resolving the process of generating computer music into two basic operations. In the first operation, the computer was instructed to generate random sequences of integers which were equated to the notes of the chromatic scale and, in certain experiments, also to rhythmic patterns, dynamics, and playing instructions such as *arco*, *pizzicato*, and *col legno*. These random integers . . . were then processed in the second, more complex operation in which each random integer was screened through a series of arithmetic tests expressing various rules of composition and either used or rejected depending on which rules were in effect. If accepted, the random integer was used to build up a “composition” and stored in the computer until the completed “composition” was ready to be printed out. On the other hand, if it was rejected, a new random integer was generated and examined. This process was repeated until a satisfactory note was found or until it became evident that no such note existed, in which case part of the “composition” thus far composed was automatically erased to allow a fresh start. (Hiller & Isaacson, 1959, pp. 3–4)

This exhaustive series of tests constitutes, as a whole, a kind of meta-test—not of the proposition as Hiller presents it, but of its converse (the ‘null hypothesis’, in some

formulations). Propose that it is *not* the case that a computer can generate a musical composition; then, if a ‘composition’ still stands at the end of the process—if all possible versions have *not* been erased—the proposition is disproven, and it has been demonstrated that a computer can generate a musical composition. This was in fact the result for Hiller: the *Illiad Suite* for string quartet was his proof.

I have quoted Hiller’s book at length, and I could have quoted it at much greater length: it runs to 179 pages of closely reasoned argument. Set this in contrast to Cage, who, as usual, makes things (seemingly) very simple: ‘What is the nature of an experimental action? It is simply an action the outcome of which is not foreseen’ (Cage, 1959 [1961], p. 69). No Monte Carlo here; no processed integers; no rejections. Do something that will produce you-know-not-what; then observe the result. The contrast between Cage and Hiller is sharpened with Cage’s next sentences: ‘It is therefore very useful if one had decided that sounds are to come into their own, rather than being exploited to express sentiments or ideas of order. Among those actions the outcomes of which are not foreseen, actions resulting from chance operations are useful’ (Cage, 1959 [1961], p. 69).

Hiller, in contrast, writes: ‘The production of random musical elements... becomes a formal element to be integrated into musical structures. More generally, the control of a precise degree of randomness and of the fluctuation of musical texture between order and disorder would seem to be more easily controlled by computer processing than by other means’ (Hiller & Isaacson, 1959, p. 171). There is a history to Cage’s use of the phrase *experimental music*, and also to Hiller’s, and that history is both complex and revealing. I shall explore it in three parts.

The history is, first, one of biographical contrasts and parallels. Hiller was 34 years old in 1958; Cage was 46. Each was an only child, and both took up the piano in their youth. Both were bright and curious children who liked to tinker: Cage with radio, Hiller with a player piano (Bohn, 2004, p. 2; Silverman, 2010, p. 11). And both had somewhat unconventional families.

Hiller’s father was an artist and photographer who developed methods for creating formally elaborate, staged, and documented illustrations; he was as much designer and technician as photographer. Hiller’s mother had been a model and chorus girl in the Ziegfeld Follies. Besides Lejaren Jr., the household contained thirty-five cats and a monkey. The family was a lively presence in New York art and theater circles; Hiller later recalled: ‘Sometimes my parents gave wild parties, with nude women and models running around the house. The police would raid our place occasionally because there was so much noise’ (Bohn, 2004, p. 2).

Cage was the son of an inventor, self-described as advocating ‘radical advances in thinking’; but the household was dominated by Cage’s maternal

family—convention-bound and Bible-reading. Cage's mother herself was not quite so staid; a regular columnist for the *Los Angeles Times*, Lucretia reported on literary, social, and sometimes musical events. But there were no monkeys or models in this family; Cage's recollections, dotted through his writings, center on such exciting moments as his aunt's acquisition of a washing machine (Cage, 1961, p. 85; Hines, 1994, pp. 67–69; Silverman 2010, p. 9).

Proceeding through the educational system, Hiller was resolutely non-Bohemian, arranging music for bands and shows but rejecting a career as a composer, though Roger Sessions offered to place him with Schoenberg. Instead, Hiller blazed through Princeton, finishing BA, MA, and PhD degrees in chemistry by the age of 23. Thereafter, he worked first for DuPont and then moved to the University of Illinois, where in 1952 he began using the path-breaking ILLIAC computer to perform statistical analyses of compounds. His interest in music had not waned, however, and it was bolstered by his marriage to Elizabeth Halsey, a capable and strong-minded actress. In 1955, he began degree work at the University of Illinois School of Music, and his MA thesis in composition eventually became *Experimental Music*. This led to the creation of the Experimental Music Studio of the University of Illinois, with Hiller as director (Bohn, 2004, pp. 3–8).

Hiller's view of 'experimental music', then, was grounded in his training and experience as a scientist. The design for the *Illiatic Suite* consisted of a sequence of four experiments, with each building on the results from the predecessors. The results were anticipated in a set of formal proposals and published in a series of technical reports. In substance as well as appearance, Hiller was a technician and the ILLIAC computer was his laboratory. The aesthetic domain was carefully limited to principles well established in music theory, so that conformity of results could be carefully measured.

Twenty years earlier, Cage had embarked on a quite different path. In the 1930s, he dropped out of college, traveled through Europe with an artistic companion, dabbled in painting and architecture, and tinkered with systematic ways of writing music. In mid-decade, he committed fully to music, studying with Buhlig, Schoenberg, and Cowell; by 1940, he had become a champion of percussion and the inventor of the prepared piano. His view of 'experimental music' was drawn from the arts, especially as encountered in Europe. Musical 'experiments', for him, followed paths that were analogous to those taken by writers and painters in the early twentieth century; he espoused a stance, an approach, a process—not a regulated method for testing results.

Thus, Cage was an artist-inventor who freely adopted terminology from science but rejected the systems of proof in which it conventionally functioned. Hiller was a scientist-musician who applied those systems of proof, together with their terminology from science, to validate artistic work. Both were in some sense the children of their fathers; but both were equally constituted from the views they had acquired through formative experiences in their twenties. In 1958, standing back to

back, they seemed to face in opposite directions; but it is just as true to assert that they were opposite sides of the same coin.

I know of no writings in which Hiller used the phrase ‘experimental music’ before he began his Master’s degree at the University of Illinois. His application of the concept and the phrase seems to be directly linked to his research project, though he may well have encountered it before. But Cage had used the phrase extensively for almost two decades before his 1958 article. And those previous uses constitute the second part of the history I want to trace. We began with ‘History of Experimental Music in the United States’ (Cage, 1959 [1961]) and I’ve already quoted from its immediate predecessor, ‘Experimental Music’ (Cage, 1957 [1961]). This short essay was written in 1957 and subsequently printed in the booklet for the recording of his 1958 Town Hall retrospective.³ It is more graceful and poetic than the ‘History’, and it eschews an actual definition. But it does establish a clear distinction between what Cage wants the phrase to mean and what it might have meant some time previously. The first three paragraphs lay out the distinction unambiguously:

Formerly, whenever anyone said the music I presented was experimental, I objected. It seemed to me that composers knew what they were doing, and that the experiments that had been made had taken place prior to the finished works . . .

Now, on the other hand, times have changed; music has changed; and I no longer object to the word “experimental.” . . . What has happened is that I have become a listener and the music has become something to hear . . .

For in this new music nothing takes place but sounds: those that are notated and those that are not. Those that are not notated appear in the written music as silences, opening the doors of the music to the sounds that happen to be in the environment . . . (Cage, 1957 [1961], pp. 7–8)

The historical meaning that Cage acknowledges but rejects is, in effect, a less formal variant of the ‘experimental method’ that Hiller modeled with the ILLIAC computer: experiments are conducted—notes, sketches, ‘integers’ are tested—and the results are kept or discarded depending on whether they conform to a pre-established set of desires, expectations, or theories. The experimentation is indeed ‘prior to the finished work’; and, for composers, it is normally conducted in private. Hiller, acting as a scientist, reveals that process; he does this to establish the validity of the tests he has conducted by enabling others to reproduce them.

Cage wishes to replace this with an ‘experimental’ practice in which the composer is as ignorant as the listener, hearing sounds that have not been tested and that can’t possibly be anticipated. He does this by admitting into the musical continuity the unpredictable sounds that occur in ‘silences’ (for ‘silence’ does not actually exist, as he later makes clear). In this way, one encounters ‘outcomes’ that are ‘unforeseen’;

and one merely observes these, rather than testing and perhaps discarding them. Cage's 1957 paper sets out a simple but radical phenomenology on which his later, more categorical essay is grounded.

It is worth noting that Cage's argument here is not metaphysical. He does not require that the outcome of an experimental action *be* unforeseen in every respect; indeed, in distinguishing notated sounds from unnotated ones, he implies that the former are indeed foreseeable. His position is psychological: he asks that the listener *attend to* that portion of the outcome that is unforeseen, rather than rejecting it as irrelevant or as a failed test. Moreover, he asserts that the unforeseen should take priority: '[A]t the parting of the ways, when it is realized that sounds occur whether intended or not, one turns in the direction of those he does not intend.... This psychological turning leads to the world of nature,... where, gradually, one sees that... nothing was lost when everything was given away' (Cage, 1957 [1961], p. 8).

Thus, there are two essays, separated by nearly two years, in which *experimental music* is the key phrase of the title. They are close kin but not the same, rather like elder and younger brother. But they were preceded by a third article, also called 'Experimental Music', which Cage wrote for the June 1955 issue of *The Score and I. M. A. Magazine*. This is father to both the later articles:

Objections are sometimes made by composers to the use of the term *experimental* as descriptive of their works, for it is claimed that any experiments that are made precede the steps that are finally taken with determination, and that this determination is knowing, having, in fact, a particular, if unconventional, ordering of the elements used in view. These objections are clearly justifiable, but only where, as among contemporary evidences in serial music, it remains a question of making a thing upon the boundaries, structure, and expression of which attention is focused. Where, on the other hand, attention moves towards the observation and audition of many things at once, including those that are environmental—becomes, that is, inclusive rather than exclusive—no question of making, in the sense of forming understandable structures, can arise (one is tourist), and here the word "experimental" is apt, providing it is understood not as descriptive of an act to be later judged in terms of success and failure, but simply as of an act the outcome of which is unknown. (Cage, 1955 [1961], p. 13)

Cage here sets out the principles very clearly: experiments formerly served as preliminary steps in determining an order and were judged by 'boundaries, structure, and expression' (cf. Hiller); but now experiments serve only observation, generating acts 'the outcome of which is unknown'. Thus, in 1955, the principles were in place; in 1957, Cage offered a practical phenomenology; and in 1958–1959, he attempted an informal taxonomy of his work and that of certain predecessors. The three articles together map a definitive, and radical, paradigm shift.

However, Cage's new paradigm replaced not only 'experimental music' as others had construed it but also his own previous use of the phrase. In his early twenties, Cage had been an unyielding modernist, fully in the Schoenberg mold. But by 1937, his ideas had begun to change. He met the filmmaker Oscar Fischinger, and he wrote a *Quartet* for percussion. The exact chronology remains unclear, but Cage later drew an explicitly causal connection: 'When I was introduced to [Fischinger], he began to talk with me about the spirit which is inside each of the objects of this world. So, he told me, all we need to do to liberate that spirit is to brush past the object, and to draw forth its sound. That's the idea which led me to percussion' (Charles, 1981, p. 73).⁴ Cage wrote additional percussion works, collaborated with dancers, and, using found objects, taught 'rhythmic expression' with his Aunt Phoebe at a progressive elementary school run by UCLA (Hines, 1994, p. 90). Then, after a stint at Mills College, he moved to the Cornish School in Seattle.

In Seattle, he gave a series of lectures. 'Some Aspects of Modern Music' dealt with rhythm and percussion music; this was followed by 'New Directions in Music' (Miller, 2002, p. 54). Another lecture evidently written for the series speaks of 'advanced or modern music' (Cage, 1939, p. 18). All three lectures reiterate phrases and concepts in common use for the past quarter-century. But in the summer of 1939, Cage offered a summer course for composers that promised 'advanced work in new materials'. He titled the course 'Experimental Music' (Miller, 2002, p. 62).

This seems to have been the turning point. He had found an adjective that suited his music and that differed from 'modern' or 'advanced'. He would use it more or less constantly over the next fifteen years, applying it first and most definitively in a lecture given in early 1940 and later reprinted as the first item in *Silence: The Future of Music: Credo*' (Cage, 1940 [1961]).⁵

There Cage asserted that the new, 'experimental' music would be concerned with *materials*—with sounds and the devices used to produce them. 'Modern' music had been preoccupied with what Cage called 'method': processes and conventions to regulate sequences of sounds, to 'bring order out of chaos'. Cage affirmed the need for method, but argued that it was secondary and would be reconceived to suit the new materials: 'The present methods of writing music... will be inadequate for the composer, who will be faced with the entire field of sound.... New methods will be discovered, bearing a definite relation to Schoenberg's twelve-tone system... and present methods of writing percussion music'. (Cage, 1940 [1961], pp. 4–5)

But he insisted that the primary focus of attention—of research, if you will—must be on the materials, which included technology as well as percussion: 'Before this happens, centers of experimental music must be established. In these centers, the new materials, oscillators, turntables, generators, means for amplifying small sounds, film phonographs, etc., available for use...' (Cage, 1940 [1961], p. 6).

Thereafter Cage spent over two decades attempting to create such a ‘center for experimental music’. He began in August 1940 with a flurry of letters to friends, businesses, and institutions; he was still at it as late as 1963 (Cage, 1963; Silverman, 2010, p. 41). The meaning of the phrase *experimental composition* shifted in the 1950s, as we have seen; but in 1958, teaching ‘Experimental Composition’ at the New School for Social Research, Cage still started with a detailed account of sound itself and the means for creating it (Kotz, 2001, p. 65). The new definition built on the previous one, after all: a simple way to encounter unexpected sounds is to produce them by wholly novel means. The difference was only that in 1958, Cage no longer wanted to ‘compose’, to order, the results (as in 1940) but simply to observe them.

For Hiller, however, Cage’s 1940 definition is simply irrelevant. The outputs of the ILLIAC computer were tested by a string quartet; there was nothing ‘experimental’ about the sounds themselves. But Hiller could equally have devised tests using brake drums if the ‘specified “rules” for composition’ required that; it was necessary only that the rules be clearly defined in advance so that the test can be evaluated. Hiller is testing a method for selecting and ordering unspecified sounds; Cage (in 1940) is discovering sounds that will be ordered by an unspecified method.

Cage’s interest in the ‘experimental’ production of sound, in observing and using ‘noise’, had precedents, of course; and these occur in two contexts. The first was educational: one of the tenets of American progressive schooling—as constructed primarily by John Dewey and his students at Columbia University—was that ‘play’ was vital to a child’s learning. It followed that a playful exploration of sound-making objects would serve better to inculcate musical sensibilities than conventional training in notation, theory, and repertory. Such education was openly ‘experimental’, and that adjective resulted in interesting linguistic compounds: ‘An opportunity to reveal their musical talent will be given children not yet old enough to enter school in experimental music classes this summer at Teachers College, Columbia University... The small children... will be taught to produce music with toy instruments, rattles, bells, drums, and triangles’ (‘Columbia to Teach Music to Babies’, 1930). Probably, the author intended that we read ‘experimental music-classes’; but, thinking of Cage working with Aunt Phoebe in just such a context, it is tempting to parse it differently: ‘experimental-music classes’.⁶

A second set of precedents can be found in earlier art-music composers. Varèse wrote for percussion several years before Cage, who evidently had heard *Ionization* when it was played in Los Angeles in 1933 (Silverman, 2010, p. 41). Luigi Russolo’s ‘The Art of Noise’ (1913) had argued for noise-making machines that a composer could ‘score and regulate harmonically and rhythmically’ (Russolo, 1913 [1971], pp. 170–171).⁷ Cage’s wife Xenia worked on a translation of Russolo’s text in the late 1930s, and Cage’s own ‘Credo: The Future of Music’ is clearly indebted to that manifesto in both content and format (Joseph, 2002, pp. 140–142; Silverman, 2010, p. 33). Henry Cowell, who had befriended Cage in the early 1930s, wrote *Ostinato Pianissimo* for percussion in 1934 and had proposed a new instrument for realizing complex rhythms as early as 1916 (Hicks, 2002, p. 89). However, none of these used

the adjective ‘experimental’ to describe the music they were making. That term seems to belong to Cage, and to Cage alone.

But does it? Is there really no precursor to Cage? Does the phrase ‘experimental music’ have no history at all before 1939? Well, yes...and no. And to clarify that ambiguous reply, I must move on to the third part of my history.

In the half-century before 1930, I find the phrase ‘experimental music’ in only a handful of instances.⁸ Commonly, it means simply ‘new repertoire’; if there is an ‘experiment’, it concerns audience reception. Typical is this early passage from Theodore Thomas, the founding conductor of the Chicago Symphony Orchestra:

We need some provision for the talent which is developing every day—we need [an] institution, well endowed, which will not be obliged to adopt a mere commercial standard for want of the means of support.... Such an institution would afford an opportunity for public or semi-public performances, by which ability would be tested and experience gained. It would also give us what we have not now—a suitable place for the performance of the works of young composers. A concert of a society like the Philharmonic is not the proper place for experimental music. (Thomas, 1881 [1905], p. 273)

But if ‘experimental music’ had little place in discourse, Busoni, Ives, and others did make notable references to ‘musical experiments’. Writing about microtones, Busoni concluded that ‘only a long and careful series of experiments, and a continued training of the ear, can render this unfamiliar material approachable and plastic for the coming generation, and for Art’ (Busoni, 1911, p. 33). His proposal is for experiments in Hiller’s sense—tests to determine whether newly generated material will be suitable for ‘Art’. But Busoni also foreshadows Cage: new music, new sounds, will require new instruments: ‘[T]he question is important and imperious, how and on what these tones are to be produced’ (Busoni, 1911, p. 33). And, again like Cage, he finds an answer in new technology; the solution, he says, is the electronic tone-generators then being developed by Thaddeus Cahill.

Ives also wrote of microtones and of ‘experiments’, but his father’s, not his own.

[Father] rigged up a contrivance to stretch 24 or more violin strings and tuned them up to suit the dictates of his own curiosity.... He started to apply a system of bows to be released by weights...but in this process he was suppressed by the family and a few of the neighbors. A little later on he did some experimenting with glasses and bells, and got some sounds as beautiful, sometimes, as they were funny—a complex that only children are old enough to appreciate. (Ives, 1925 [1970], pp. 110–111)

This is even more like Cage (and Aunt Phoebe, again): sounds are discovered, observed, and playfully explored, without tests or conclusions.

Perhaps more directly relevant was Edgard Varèse, who, Cage wrote in 1958, ‘fathered forth noise into twentieth-century music’ (Cage, 1959 [1961], p. 69). Varèse’s oft-quoted pronouncement—‘The very basis of creative work is experimentation—bold experimentation’—was delivered in California in 1939, just as Cage started teaching his Seattle course on ‘Experimental Music’ (Varèse, 1967, p. 199).⁹ But for Varèse, like Busoni, experimentation served what he called ‘the “inner ear,” the ear of imagination’; and like Busoni, he sought assistance from technology: ‘for my conceptions, I need an entirely new medium of expression: a sound-*producing* machine (not a sound-*reproducing* one)’ (1967, pp. 199, 200). Busoni and Varèse are the rightful forbears of a European concept of ‘experimental music’, as manifested in *Revue Belge de Musicologie* (Deliège, 1959), the third source with which we started; the contributors to that issue focus predominately on the potential and control of electronic technology. Writing at the same time, Cage, however, rightly observed that Varèse’s approach (and, implicitly, that of the Europeans) made it difficult ‘to hear the sounds just as they are, for they draw attention to Varèse’ (Cage, 1959 [1961], p. 69).

None of these precursors, however, used ‘experimental music’ to define a genre with distinct characteristics. That usage has quite a different history.

In the first two decades of the twentieth century, it became necessary to find new terms for the new compositions then emerging; the adjectives ‘modern’ and (later) ‘ultramodern’ prevailed. But by the 1920s, these were wearing thin, and ‘experiment’ (and ‘experimental’) began to appear, sometimes contrasted with ‘modern’, sometimes used as a synonym. Paul Whiteman, a master at blurring distinctions, promoted the 1924 concert that introduced *Rhapsody in Blue* as ‘An Experiment in Modern Music’ (Schwartz, 1973, 79). Later that year, a certain J. Wearham compounded both terms while grumpily defending Mendelssohn in *The Musical Times*: ‘It is not surprising that [his] deep and sacred appeal . . . should be lost in these days of night clubs, jazz, and (what is worse) “modern-experimental-music”’ (Wearham, 1924).

The influential critic Paul Rosenfeld began applying ‘experiment’ liberally in explaining recent art-music; for him, the ‘experimental’ was a necessary phase preparatory to the creation of great and novel music. Writing of Strauss’s tone poems, he notes that ‘Berlioz and Liszt had experimented with the narrative, descriptive, analytical symphony But Strauss, benefiting by the experiments of his two predecessors, realized the new form better than any one before him had done’ (Rosenfeld, 1920, pp. 29–30). An individual composer exploring new ground will also conduct experiments; Rosenfeld makes this point repeatedly with respect to Schoenberg. Speaking of the works of the 1910s, he writes:

[I]t is only as experiments . . . that one can at all comprehend them It may be that by means of these experiments Schoenberg will gird himself for a new period of creativity just as once indubitably by the aid of experiments which he did not publish he girded himself for the period represented by the D-minor Quartet But, for the present, Schoenberg, the composer, is almost completely obscured by Schoenberg, the experimenter. (Rosenfeld, 1920, pp. 234, 240, 242)

This is precisely the historical meaning for ‘experiment’ that Cage presents at the beginning of his 1957 essay: ‘the experiments that had been made had taken place prior to the finished works’ (Cage, 1957 [1961], p. 7). It is the meaning implied by Hiller not only in creating the *ILLIAC Suite* but also in applying the results; the final pages of his book outline several paths to future, more substantial, work. But it has very little to do with *experimental music* as Cage used the term in the 1940s.

To summarize: by the early 1920s, musical ‘experiments’ were of three types. One was, in effect, concerned with marketing and presentation; ‘experimental music’ was in this context merely repertory that had not yet been tested before an audience. A second was technical, concerned with the augmenting the materials of music and the means of their production; here, the ‘experiments’ would establish whether a new class of sounds were actually useful in musical composition. And the third was historical; musical experiments need not themselves be of aesthetic value but must be conducted (normally in private) to establish and refine new musical methods.

At some point toward the end of the decade, however, ‘experimental music’ became a genre, as had ‘modern’ and ‘ultramodern’ before. The latter terms were unavoidably linked with figures like Stravinsky, Schoenberg, and Ornstein; there were younger composers now, and they required a new label. The change was intimated as early as 1924, when Chalmers Clifton, a New York conductor, linked the old and new terms by arguing that ‘experimental music . . . should find place solely in the activities of groups that are devoted to modern movements, and should never encumber the plans of concert bodies that are established to serve the public at large’ (‘Experimental Music and Musical Progress’, 1924). In part, Clifton was merely restating Theodore Thomas’s position from forty years earlier; but ‘experimental music’ now included compositions that were not merely untested but had (in present-day parlance) an ‘attitude’. Controversy and conflict were taken as assets of the music being made, and the word ‘experimental’ was both a defense (experiments are necessary and useful) and a red flag (experiments are not art).

The ‘groups’ to which Clifford referred were, of course, the outspoken new music organizations of the 1920s: the International Composers’ Guild, Pro Musica, the League of Composers, and the Franco-American Society. Olin Downes confirmed the link between these groups and the new genre in a 1927 review: ‘[T]he concert given by the League of Composers was one of exceptional interest. This concert, by an organization which espouses the cause of the newest and most experimental music, placed side by side the works of advanced composers today and productions of revolutionists of the years circa 1600’ (Downes, 1927).

By 1930, the term seems to have become fully accepted if not universally approved. An article about Julian Carrillo begins: ‘Experimental, present-day music is often called, though with the consent of scarcely anyone who writes it’ (‘Experimental Music’, 1930). It was also internationally applied; in England, the following year,

L. Dunton Green clearly distinguished ‘experimental’ music as a genre *within* the broader field of ‘contemporary’ music:

Should [these Festivals] reflect current tendencies or serve as demonstration of ‘advanced’ experiments? The sponsors of the latter theory go so far as to suggest that if no such experimental music be forthcoming, the Festival should not take place. To my mind this way of thinking is entirely erroneous and quite contrary to the spirit in which the International Society for Contemporary Music was founded. Its title alone is sufficient proof that what is intended is undoubtedly to reflect in these Festivals the tendencies of contemporary music as a whole, and not in the form of its most extreme manifestations only. (Green, 1931, p. 32)

Thereafter, through *Modern Music* and other journals, the phrase ‘experimental music’ gained a more secure foothold. The adjective was even accepted into historical musicology, if only by way of comparison; writing in 1933 about the eighteenth-century figure Maddalena Lombardini, Marion M. Scott described her as ‘for her day, a modernist, an experimental composer’ (Scott, 1933, p. 155).

By the end of the decade, however, its connotations were as much social and political as aesthetic, and the phrase had begun to be marginalized not only by residual modernists but also by the socially conscious composers of the Great Depression. Thus, in 1939, when Cage invested the phrase with a quite specific meaning, he was both giving it new life and acknowledging its previous incarnations. He insisted on the need for new sounds, new instruments, as Busoni had. He welcomed the radical connotations and the controversies of the previous decade. And he accepted the implication that ‘experimental music’ was, at least in part, a private activity best pursued in a special place, a ‘center’, where results could be explored without prejudice before public performance. But the clear boundaries, the single-minded focus on sound, and the insistence that method *follow* observation rather than limit it—these were his own, and they guided his work and the work of others for many years to come.

So Yes, ‘experimental music’ had a history. But also no: it seems to have become something altogether different when Cage adopted the phrase.

But nothing in the history thus far prepares us for Cage’s redefinition of the phrase in the 1950s, when ‘experimental music’ became pure observation—no tests, no conclusions. To find precedents for this, we must look beyond music.

For many of the arts, the adjective ‘experimental’ has a long and rich history (Nicholls, 1990, p. 220). In some fields, the application of the term resembles its use in music; in others, it varies significantly. In the first category is theater: the dozens of references to ‘experimental theater’ in the early part of the twentieth century nearly all concern the establishment of a venue where new work can be tried out free from commercial pressures, very much as Thomas had argued in 1881.¹⁰

Cinema offers a different parallel; the ‘experimental cinema’ was well established by 1930, when the first issue of a journal by that name was published; what made it ‘experimental’ was, above all, the use of new techniques for producing images, much as Busoni and the Futurists had pursued new possibilities for producing sound. Oscar Fischinger, who so inspired Cage, was very much part of this movement.

The phrase *experimental painting* occurs more rarely and seems to have been used loosely, embracing both aesthetic stances and practical techniques. However, a 1916 article by the then-president of the National Academy of Design stands in a sort of counterpoint to the later discourse in music: ‘The experimenter sees the delights and the possibilities of varying styles, but he seldom masters any.... [T]hese experimenters are wanderers through the realm of fixed technical expression.... They essay the methods of one medium when employing another.... They make poor teachers of *technique*. Nonetheless, they are our greatest artists’ (Weir, 1916, p. 129). And a passing remark in an article on etching explicitly invokes the scientific analogy implied in the writings of Busoni, Varèse, and others: ‘What every art most needs is the injection into it of new ideas—to be constantly employed as a field for laboratory experimentation’, (Bradley, 1917, p. 644).

However, the most illuminating application of the adjective ‘experimental’ came in literature. By the 1930s, there was widespread use of the phrase ‘experimental writing’ to describe certain work of the past three decades—notably that by T. S. Eliot, James Joyce, Ezra Pound, and Gertrude Stein.¹¹ But the phrase was in common parlance two decades earlier. When H. G. Wells’s reviewed *A Portrait of the Artist as a Young Man*, he situated James Joyce in a field of ‘fresh and experimental writing’, portraying him specifically as ‘a bold experimentalist with paragraph and punctuation’ (Wells, 1917, pp. 710, 712). In poetry, ‘experiment’ was used as both badge and brickbat. A 1914 advertisement for the journal *Des Imagistes* boasted of publishing ‘young experimentalists’ ([‘Advertisements’], 1914)¹²; two years later, Macmillan Co. headed an advertisement by assuring readers (in large type) that a volume of poems by Gustaf Froeling was ‘Not experiment—Literature’ ([‘Advertisements’], 1916). The seminal literary journal *transition*, celebrated for publishing Joyce and Stein in the 1920s, was subtitled ‘an international quarterly for creative experiment’.¹³

Often the ‘experimental’ aspects of writing were spelled out in specific, technical terms. Wells had noted Joyce’s ‘paragraph and punctuation’; a nearly contemporaneous lecture by W. B. Yeats cites ‘the metrical experiments of French poets’ and continues by praising Ezra Pound: ‘Much of his work is experimental; his work will come slowly, he will make many an experiment before he comes into his own.... *The Return*... is the most beautiful poem that has been written in the free form, one of the few in which I find real organic rhythm’ (Yeats, 1914, pp. 47–48). ‘Experimental writers’, de- and re-constructing syntax, meter, and rhyme, are close cousins of the ‘modern’ composers that were their contemporaries. And it was quite reasonable for Yeats and many others to find their immediate forbears among the authors of French

verse. But the godparents of ‘experimental music’, as described by Cage in the 1950s, are to be found elsewhere.

In 1880, Émile Zola published a controversial essay entitled ‘The Experimental Novel’ (Zola, 1880 [1893]).¹⁴ Zola based much of his argument on a book by Claude Bernard, a physician and philosopher of science, and he drew close parallels between writing and the scientific method.¹⁵ Zola’s essay is in part a defense of the naturalist fiction for which he had become a spokesman; but in it, he went well beyond naturalism’s basic tenets. ‘I am going to try and prove...,’ he wrote, ‘that if the experimental method leads to the knowledge of physical life, it should also lead to the knowledge of the passionate and intellectual life. It is... the same path which runs from chemistry to physiology, then from physiology to anthropology and sociology. The experimental novel is the goal’ (Zola, 1880 [1893], p. 2).

Crucial to Bernard’s argument is a distinction between ‘observation’ and ‘experiment’. Zola quotes Bernard at length:

The observer relates purely and simply the phenomena which he has under his eyes.... He should be the photographer of phenomena, his observation should be an exact representation of nature. He listens to nature and he writes under its dictation. But once the fact is ascertained and the phenomenon observed, an idea or hypothesis comes into his mind, reason intervenes, and the experimentalist comes forward... [He] institutes an experiment in such a way that... it... will serve to confirm the hypothesis or preconceived idea. (Bernard, quoted in Zola 1880 [1893], p. 7)

This is precisely the difference with which I began. In 1958, Cage would have us ‘listen to nature’ and ‘write under its dictation’. Hiller ‘instituted an experiment’—which, for clarity, I called a ‘test’—‘to confirm a hypothesis or preconceived idea’.

Zola then proposes that

the novelist is equally an observer and an experimentalist. The observer in him gives the facts as he has observed them... displays the solid earth on which his characters are to tread and the phenomena to develop. Then the experimentalist appears and... sets his characters going in a certain story so as to show that the succession of facts will be such as the requirements of the determinism of the phenomena under examination call for. (Zola, 1880 [1893], p. 8)

Somewhat later he presses the parallel even further: ‘We [novelists] are making use, in a certain way, of scientific psychology to complete scientific physiology... [W]e should operate on the characters, the passions, on the human and social data, in the same way that the chemist and the physicist operate on inanimate being, and as the physiologist operates on living beings’ (Zola, 1880 [1893], p. 18).

And why should a novelist follow this path? In order to ‘construct a practical sociology, and... [to] be a help to political and economic sciences.’ ‘We are’, Zola asserts, ‘... experimental moralists, showing by experiment in what way a passion acts in a certain social condition’ (Zola, 1880 [1893], pp. 25, 26).

With this agenda, Zola's 'experimental novel' of 1880 becomes largely coextensive with the emerging discipline of psychology—which, not coincidentally, also acquired the adjective 'experimental' at this time. And, to some extent, the 'experimental novel' departs from the realism that was the touchstone of Zola's writing: its focus is as much about 'passions' as about social conditions. Thus, when the next generation of writers turned away from realism, narrowly conceived, they found themselves unexpectedly following Zola's implied agenda. Writers like Joyce and Stein, tracking the 'stream of consciousness', deconstructed language precisely to reveal the workings of 'characters' and 'passions' in time, much as their artistic contemporaries deconstructed the image to probe the workings of perception in space.

Zola's argument thus becomes aligned with the writings of William James, whose *Principles of Psychology* (1890) is likewise concerned with 'characters' and 'passions'. James wrote introspectively, offering thought-experiments—rather like novels—which propose hypotheses about human behavior; but he also instituted a research laboratory in which those hypotheses could be rigorously tested. And in constructing a 'radical empiricism' that confounded scientific objectivity, James (with Bergson) laid the philosophical foundations for 'stream-of-consciousness' literature.

Among the 'experimental writers' of the early twentieth century, Gertrude Stein was the one most directly indebted to James and Zola. Stein trained to be a physician and worked in James's laboratory before moving to Paris in 1903.¹⁶ Her early works derive in part from that experience; writing of herself in the third person, Stein summarizes:

She was one of a group of Harvard men and Radcliffe women and they all lived very closely and very interestingly together . . . The result of her own experiments, which Gertrude Stein wrote down and which was printed in the Harvard Psychological Review was the first writing of hers ever to be printed. It is very interesting to read because the method of writing to be afterwards developed in *Three Lives* and *Making of Americans* already shows itself. (Stein, 1933 [1946], p. 65)

Indeed, *Three Lives* conforms almost exactly to Zola's model: Stein 'sets her characters going' to see what they will do, in a scrupulously depicted environment. But *The Making of Americans* attempts something grander: a typology of human nature. Stein, under the influence of James, takes Zola's argument well beyond the particular; she moves from accounts of individuals through theories of personality to self-reflective, recursive exploratory prose. Her conclusion is, like James, radically empiricist: her experiments will concern not merely at 'characters' and 'passions' but writing itself.¹⁷

Thus, after *The Making of Americans*, Stein turned away from 'experiment', as Zola would have had it. *Tender Buttons* sets nothing 'going'; Stein is no longer 'equally an observer and an experimentalist', but simply an observer, first of objects and then of individuals.

These were the days in which she wrote *Susie Asado* and *Preciocilla* and *Gypsies in Spain*. She experimented with everything in trying to describe... [S]he stayed with her task, although after the return to Paris she described objects, she described rooms and objects, which joined with her first experiments done in Spain, made the volume *Tender Buttons*. She always however made her chief study people... (Stein, 1933 [1946], p. 99).

In an oft-quoted passage, Stein generalizes more broadly:

Gertrude Stein, in her work, has always been possessed by the intellectual passion for exactitude in the description of inner and outer reality. She has produced a simplification by this concentration, and as a result the destruction of associational emotion in poetry and prose. She knows that beauty, music, decoration, the result of emotion should never be the cause, even events should not be the cause of emotion nor should they be the material of poetry and prose. Nor should emotion itself be the cause of poetry or prose. They should consist of an exact reproduction of either an outer or an inner reality. (Stein, 1933 [1946], p. 99)

This, too, had been anticipated somewhat in Zola's essay. Summing up, Zola wrote: 'The experimental novelist is therefore the one who accepts proven facts, who points out in man and in society the mechanism of the phenomena over which science is mistress, and who does not interpose his personal sentiments' (Zola, 1880 [1893], p. 53). That could be Stein; or it could be Cage: 'writing [experimental] music... is... simply a way of waking up to the very life we're living, which is so excellent once one gets one's mind and one's desires out of its way and lets it act of its own accord' (Cage, 1957 [1961], p. 12).

But Cage stops there; Zola continues his sentence: 'except in the phenomena whose determinism is not yet settled, and who tries to test, as much as he can, this personal sentiment, this idea *a priori*, by observation and experiment'. (Zola, 1880 [1893], pp. 53–54) That could be Hiller.

When Stein moved beyond Zola's 'experimental novel' to explore what became called 'experimental writing', she shifted the paradigm much as Cage did forty-five years later. She imposed a narrative 'silence' so that words would speak only for themselves, acting as descriptors of the present moment, playing at the point of their own origin. Cage encountered his own 'silence' in an anechoic chamber at Harvard, and he chose thereafter to 'let sounds be themselves, rather than vehicles for man-made theories or expressions of human sentiment' (Cage, 1957 [1961], p. 10).

Cage is, I would suggest, a true descendant of Stein. In his early years, he was greatly enamored of Stein's writing: he set three of her texts in his earliest compositions and a fourth as a movement of *Living Room Music*, claimed to have imitated her style and cited her frequently in interviews and writings (including 'History of Experimental Music in the United States') (Cage, 1959 [1961], p. 73).¹⁸ Stein was a conduit for two traditions that shaped Cage's thinking: the literary

radicalism of Europe, begun arguably by Zola and taken forward in journals like *transition*, and the pragmatic philosophy of William James. Finally, I would suggest that both Cage and Hiller carry forward, in their ‘experimental music’, the fusion of science, aesthetics, and social initiatives that characterized pragmatist thought on both sides of the Atlantic; both were not only experimentalists but also progressives.¹⁹

Cage and Hiller flowed through a broad basin that was fed by many streams. Among the largest of these were the commingled waters of pragmatism and progressivism—pragmatic philosophy, social progressivism, and an optimism, a faith in education, newly conceived, that characterized both. Tributaries reached back to Europe, to Zola and others; sometimes (as with Stein) they were simultaneously European and American. A wellspring for much of this thought, especially in America, was William James, and Cage’s and Hiller’s thinking both manifest Jamesian traits. But they draw from different aspects of James’s work: Hiller from the James that founded a laboratory to conduct tests in experimental psychology, Cage from the James that insisted on an empiricism so radical that it turned consciousness into a stream and experiment into observation. In 1959, Cage and Hiller faced in different directions, but they stood on the same ground; they had only to shift their gazes to find common purpose. This they did in the decade that followed, culminating in the co-authorship of *HPSCHD* in 1969.

Hiller, as noted earlier, moved on from the *ILLIAC Suite* to become the head of the University of Illinois Experimental Music Studio. This facility was, on the one hand, consistent with European notions of ‘experimental music’ reflected in the 1959 issue of *Revue Belge de Musicologie* and also in its immediate American predecessor, the Columbia-Princeton Electronic Music Center. On the other hand, its heterogeneous assemblage of equipment, egalitarian social structure, and non-doctrinaire aesthetic all recall Cage’s proposals for a ‘Center for Experimental Music’ from twenty years before.²⁰

Hiller’s compositional thinking was also evolving. The *ILLIAC Suite* was followed by the *Computer Cantata* (1963), and this is more closely related to Cage’s requirement that ‘experimental’ music produce an outcome which is unforeseen. Indeed, the four movements of the *ILLIAC Suite* itself move successively towards this principle. The first tested the ability of a properly programmed computer to complete a task in species counterpoint; the test is of the equipment, and the output is measured against predetermined criteria. The second begins with diatonic randomness and then gradually introduces rules which yield, in the final bars, music exactly like the first movement. There is no historical model by which the output can be judged, and so the test of the equipment is implicitly supplemented by a second question: can a listener perceive the change (from disorder to order) that was envisioned by the composer-programmer? In the final two movements, all traces of

historical precedent are removed; rather than a familiar style, the listener encounters ‘outputs’ which result from novel, untried sets of rules. The experiment begins to open up: what *does* happen, given these rules? and is the result, in some sense, aesthetically satisfactory?²¹

The eleven movements of the *Computer Cantata* alternate between ‘strophes’ and ‘prologs’ or ‘epilogs’. The strophes apply a systematic experimental method much like the *ILLIAC Suite*, but the intervening movements use unrelated and largely independent programming strategies. Though Hiller certainly had expectations, these movements are essentially attempts to ‘see what happens if’. Rather than testing the outcome against preconceived criteria, the procedure is validated by the simple fact that an outcome is obtained. Writing in 1967, Hiller explained: ‘This piece is truly experimental because it is concerned with revealing process as well as being final product. It is an embodiment of objective research results. It is a laboratory notebook. Sometimes the results surprise us because a compositional routine seemed less effective than expected, sometimes more so. If I had deleted everything that disturbed me esthetically, I would have falsified the research record’ (Hiller, 1967 [2008]). This is very like Cage, though carefully protected by a screen of quasi-scientific discourse.²²

Cage’s thought was evolving as well; and, like Hiller, the changes were intimated even before 1959. To implement his ‘experiments’, Cage had used chance procedures; but these determined the *notation*, not the actual sounds, which were produced by performers ‘reading’ a score. In his first two ‘experimental music’ essays, the crucial distinction is between sounds ‘that are notated and those that are not’ (Cage, 1957 [1961], p. 7). In 1958, he summarized his practice but issued a challenge: ‘Could music be composed (I do not mean improvised) not writing it in pencil or in ink? The answer is no doubt Yes ...’ (Cage, 1958 [1961], p. 34). And in 1959, he insisted on a response: ‘More essential than composing by means of chance operations... is composing in such a way that what one does is indeterminate of its performance’. He then described the score to *Music Walk*, adding, ‘In this situation no chance operations are necessary (for instance, no tossing of coins) for nothing is foreseen, though everything may be later minutely measured or simply taken as a vague suggestion’ (Cage, 1959 [1961], p. 69).²³ The *Variations* series and other scores from the 1960s take forward this principle, increasingly as mere ‘vague suggestions’.²⁴

Thus, in the 1960s, just as Hiller was moving toward Cage’s practice in the 1950s, Cage was moving away. But both were affected by another significant change in the construction of ‘experimental music’.

Sometime after the mid-1950s, the influential critic Peter Yates became convinced that there was a distinct American musical practice which embraced Ives, Cowell, Cage, and many others. His phrase for this—the ‘American experimental tradition’—found its way into print at the head of an article (Yates, 1959) at the same time as Hiller’s book and Cage’s ‘History of Experimental Music in the United States’.²⁵ It gained wide popularity in the 1960s and its cultural position was solidified by Yates’s 1967 book on *Twentieth Century Music*. Cage and Hiller both were entangled in

Yates' evolving model; Cage in correspondence with Yates, and Hiller when Yates lectured at Illinois at the Festival of Contemporary Art.²⁶ Cage was interested but cautious about Yates' somewhat arbitrary categories (Beal, 2008, pp. 676–679); Hiller's endorsement was less qualified (Bohn, 2004, p. 118).

For Yates, the 'experimental tradition' was largely defined by a kind of 'outsider' status: '[T]he way to differentiate American experimental music', he declared, 'is the extent to which it is free of academic conditioning' (Beal, 2008, p. 679). This assertion came to dominate the discourse on 'experimentalism' for several decades, so much so that the conventional training of later figures like James Tenney, Philip Corner, and Frederick Rzewski was often deliberately ignored by their 'experimental' partisans. And it was especially welcome in the 1960s, when the 'establishment' was suspect, individualism was rife, and the phrase 'counter-culture' positioned an entire generation as outsiders.

Hiller and Cage fit quite neatly into Yates's model—the former because his formidable academic qualifications were not in music, the latter because he was a celebrated dropout. Thus, by 1967, Cage and Hiller found themselves, willy-nilly, in the same camp: their 'experimentalism' was now established by cultural and biographical factors, and their technical and aesthetic differences had become irrelevant.

Hiller clearly enjoyed his new position, and it was natural for him to propose a collaboration to Cage, who had many friends at Illinois and had often visited the campus. Hiller's own work had evolved to the extent that he felt no great gap between Cage and himself; both were interested in randomness, and a collaboration was nothing more than a new application of order/disorder as a musical parameter.

Cage, too, had reasons to rethink his rejection of notation and espousal of indeterminacy. For one thing, a number of performances in the 1960s awakened him to the possibility that indeterminacy might not always work so well. These included not only notorious renditions by professionals (in which Cage was often a provocateur) but also performances by seeming allies, like Charlotte Moorman and Nam June Paik (Piekut, 2011, chapters 2 and 4). Even devoted collaborators like Tudor and Cunningham often found themselves, with Cage, in impossible situations that required proactive, willful solutions that were far from indeterminate. One of the retrospective instructions on the 'score' for *Variations V* reads 'Adapt to physical circumstances: procrastination, mistakes' (Miller, 2001, p. 554).

Moreover, throughout the 1960s, Cage was increasingly inclined to assert that sheer abundance was sufficient to create an indeterminate situation: 'Sounds everywhere. Our concerts celebrate the fact concerts're no longer necessary' (Cage, 1967, p. 154). 'Concerts', then, could be indeterminate even if realized from fully composed scores—if there were enough of them. A collaboration with Hiller and with Hiller's computer, churning out 'random sequences of integers', could produce the necessary quantity of material: '[W]orking with another person and with computer facilities', Cage said, 'the need to work as though decisions were scarce—as

though you had to limit yourself to one idea—is no longer pressing. It's a change from the influences of scarcity or economy to the influences of abundance and—I'd be willing to say—waste' (Austin, 1968, p. 13).²⁷

But perhaps a more deeply rooted motivation was Cage's radical empiricism. Like William James, Cage's attended throughout his life to *experience*, and particularly the experience of sound. James's empiricism was 'radical' because 'the parts of experience hold together from next to next by relations that are themselves parts of experience' (James, 1909, p. xiii). There is nothing other-worldly, nothing 'trans-empirical' about relations; they are experiential, real, and therefore subject to change. Cage started from this position; his task in the 1950s was to find compositional methods that changed the *experience* of listening so that sounds would be themselves and relations would become no-relations. Those methods, those no-relations, were themselves to be experienced; the negation of relations was to be a positive presence, not an absence.²⁸ It was thus very important that Cage know what he was doing, that he attend to the methods, as well as the sounds.

In the indeterminate works of the 1960s, Cage often did *not* know what he was doing. And though he rejoiced in this for a time, the experience was ultimately disquieting. The computer required a precision, notational as well as conceptual, that led back to method and to the *experience* of method. Speaking in 1968, he was clearly captivated by the implications:

This is the first time in history that we have any way to be able to say with accuracy what it was that was thought in order to bring about the thing that eventually took place As we think, without having to explain ourselves to a machine, we make "leaps." Things that don't seem to us to be important are skipped over—but may not be skipped over in the case of the machine. Each step must be spelled out absolutely clearly. (Austin, 1968, p. 11)

After *HPSCHD*, Cage accepted the spectrum between precision and indeterminacy as a compositional parameter. In this, he was possibly influenced by Lejaren Hiller's closely related preoccupation with compositional exploration of the spectrum between order and disorder. Cage's next major work, the *Song Books* (1970) embraces everything from fully composed scores to improvisation, relying (like *HPSCHD*) on abundance to create an atmosphere of indeterminacy (Brooks, 1982). And the extraordinary complexity of the *Freeman Etudes* (1977–1990) results from the application—to himself—of the extreme rigor required by the computer (Brooks, 2009).

Cage's experience with *HPSCHD* also shaped his views about the future of music. There is a prescient passage in his 1968 conversation with Larry Austin: '[A] [computer] routine, once constructed, is like an accomplishment on the part of society rather than on the part of a single individual The logic of a routine, once understood, generates other ideas than the one which is embodied in it. This will lead, more and more, to multiplication of music for everybody's use rather than the private use of one person' (Austin, 1968, p. 12).

The computer, in effect, becomes an instrument on which we play; and like the piano when newly prepared, the results can be other than we expect. In working with computers, all the notions of ‘experimental’ music apply: the historical usage, in the testing and refining of algorithms; Cage’s work in the 1940s, in devising new and precise methods for manipulating undetermined sounds; and Cage in 1955, in producing results which are unforeseen. ‘This would lead us to believe’, he concludes with characteristic optimism, ‘that this experience of being surprised by what it is that we experience will continue’. And (is it Schoenberg I hear?): ‘The changes I’m speaking of are not slight ones but are almost as if it were another country, another continent, or another planet that had been discovered’ (Austin, 1968, p. 12).

It is 2012. Picture me on my bicycle. I’m riding home by my usual route. There’s a road that angles off to the right. I ask myself, ‘I wonder if this is a faster route?’ I take my phone, which knows (better than I) where I am. It quickly tells me this would *not* be a faster route. ‘Ah, but ...’ (I think) ‘... I wonder where it goes?’ Shifting to street view, I quickly find out: past a pub, a sports field, a small wood, and much more. I cycle home. Does it matter which way I take?

It is difficult to conduct a test in a world awash in answers. (Abundance has its difficulties.) And when we’ve been there, virtually, can we really observe? Won’t we see, willy-nilly, what we expect to see? One thing is for certain: there is no need for a ‘center’ any longer. Experimental music, whatever it has become, is distributed, not localized. I could tweet, I could post: the networks are multiple and interpenetrating. Or I can shut my electronic eyes; I can go to the woods, front only the essential facts of life.

But if there is not experiment, if there is not even observation, there is still experience. And in experience there are relations; and if we accept these, the empirical universe opens again. There is always something to experience, even if it is foreseen. We need not fear. And not just about the future of music.

Notes

- [1] Substantial parts of this paper were given in various forms during my tenure as a Fellow at the Orpheus Research Centre in Music, Ghent, Belgium, 2009–2012. I am grateful to the Orpheus Institute for its support, and I am even more grateful to my Orpheus colleagues for their penetrating comments and criticism. Thanks also to Ed Crooks and Jon Brigg at the University of York for their insightful feedback and suggestions.
- [2] My debt to Karl Popper is obvious, though I’ve surely misrepresented the elegance of his reasoning. See in particular Popper, 1959.
- [3] Cage’s presentation was part of a panel on ‘experimental music’ at the Music Teachers National Association convention, 10 February 1957. See ‘1,000 Teachers of Music at Meeting Here’, 1957, p. 22.
- [4] Brown, 2012, gives a detailed account of the relationship between Cage and Fischinger.
- [5] In *Silence*, the date is incorrectly given as 1937; see Miller, 2002, pp. 54–56.

- [6] (Aunt) Phoebe James taught, with Cage, ‘development of rhythm and musical accompaniments for creative expression’; see ‘Rhythm to be Taught in Extension Class’, 1938, p. C5.
- [7] Cage linked Russolo and Varèse in a 1940 letter to Yates; see Hicks, 2007.
- [8] Full-text searches were conducted in ProQuest Historical Newspapers, Google Books, the HathiTrust Digital Library, and several smaller digital archives, as well as in specific journals. Christoph von Blümroder (1995) supplies a useful history of the term ‘experiment’ in earlier treatises and writings. My thanks to Hans Roels of the Orpheus Institute for bringing this to my attention.
- [9] Varèse’s lecture was at the University of California on 5 June 1939; see Shreffler, 2006, p. 290. It is unlikely that Cage was present; see Miller, 2002, p. 62.
- [10] In Britain, see, for example, Guest (1908) whose article (one of a series) elicited many telling responses in subsequent issues. In America, see M[onroe], 1918, p. 207.
- [11] See, for instance, Boyd, 1930.
- [12] The phrase occurs in a testimonial quotation from *The Post* (London).
- [13] Branden Joseph gives a rich account of the importance of *transition* to many aspects of Cage’s thought (2002, pp. 144–149).
- [14] All quotations are taken from the English translation (1893).
- [15] Bernard’s work, *Introduction a l’Étude de la Médecine Experimentale*, appeared in 1865.
- [16] Two recent dissertations provide penetrating insights and a wealth of detail about the relationship between Stein, James, and early psychology. On the relationship between James’s theories of perception and Stein’s approach to art, see Galligan, 2007; on the relationship between Stein’s laboratory experience and her writing, see Brazier, 2010.
- [17] The literature on Stein is vast; I am especially indebted to Meyer, 2001.
- [18] See Dickinson, 1986, for a compact summary of Stein and Cage and a brief discussion of the *Three Early Songs*; see also Nicholls, 1990, p. 175. For Cage imitating Stein, see Dickinson, 2006, pp. 50–52, and (for further background) chapters 1, 7, and 10. Though there is controversy about whether Cage wrote a Stein pastiche in college, the scenario for *Credo in US* amply confirms his ability to do so.
- [19] I have previously argued for a link between Cage and pragmatism (2007 and 2009), as has Austin Clarkson, quite convincingly (Clarkson, 2001). In the present context, it is worth noting that it was John Dewey who carried forward James’s work in aesthetic and social domains. Dewey’s theories of ‘progressive education’ were pervasive in the 1930s; Cage, as we have seen, would have encountered them through the classes taught by Aunt Phoebe James and, somewhat later, at Black Mountain College.
- [20] Bohn, 2004, chapter 4, gives a detailed account of the history and contents of the Illinois Experimental Music Studio.
- [21] The lengthy discussion in Hiller and Isaacson (1959) is compactly summarized in Bohn, 2004, chapter 9.
- [22] For details of the compositional procedures, see Hiller and Baker, 1964, and Bohn, 2004, chapter 10. Mauceri, 1997, pp. 194–197, to whom I am indebted, offers a cogent critique of the ‘experimental’ character of the *Computer Cantata* and the *ILLIAC Suite*.
- [23] Pritchett, 1993, chapter 4, skillfully summarizes the transition between chance composition and indeterminacy.
- [24] Miller, 2009, provides an overview.
- [25] My thanks to Kirstin M. Dougan, University of Illinois Music and Performing Arts Librarian, for supplying me with a copy. Yates’ article was extracted from a publication by the New York Public Library, *Some Twentieth Century American Composers: A Selective Bibliography*. Yates may have introduced the phrase earlier—he was a tireless lecturer and correspondent—but I cannot locate it in print before the 1959 article. See also Beal, 2008, who does track a few similar uses by German writers in the mid-1950s.
- [26] Cage’s relationship with Yates dates back at least to 1940; see Hicks, 2007.

- [27] On the relationship between *HPSCHD* and abundance (and many other cultural markers of the 1960s), see Heimbecker, 2011. A forthcoming publication by Branden Joseph, cited in Piekut, 2011, p. 60, may well supersede many of my comments, but I have not seen it.
- [28] This position is most consistently and poetically argued in the ‘Lecture on Nothing’ (Cage, 1950 [1961]).

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