The following three lectures were given at Darmstadt (Germany) in September 1958. The third one, with certain revisions, is a lecture given earlier that year at Rutgers University in New Jersey, an excerpt from which was published in the Village Voice, *New York City, in April 1958.*

COMPOSITION AS PROCESS

I. Changes

Having been asked by Dr. Wolfgang Steinecke, Director of the Internationale Ferienkurse für Neue Musik at Darmstadt, to discuss in particular my Music of Changes, *I decided to make a lecture within the time length of the* Music of Changes *(each line of the text whether speech or silence requiring one second for its performance), so that whenever I would stop speaking, the corresponding part of the* Music of Changes *itself would be played. The music is not superimposed on the speech but is heard only in the interruptions of the speech—which, like the lengths of the paragraphs themselves, were the result of chance operations.*

This is a lecture on changes that have taken place in my composition means, with particular reference to what, a decade ago, I termed "structure" and "method." By "structure" was meant the division of a whole into parts; by "method," the note-to-note procedure. Both structure and method (and also "material"—the sounds and silences of a composition) were, it seemed to me then, the proper concern of the mind (as opposed to the heart) (one's ideas of order as opposed to one's spontaneous actions); whereas the two last of these, namely method and material, together with form (the morphology of a continuity) were equally the proper concern of the heart. Composition, then, I viewed, ten years ago, as an activity integrating the opposites, the rational and the irrational, bringing about, ideally, a freely moving continuity within a strict division of parts, the sounds, their combination and succession being either logically related or arbitrarily chosen. ¶The strict division of parts, the structure, was a function of the duration aspect of sound, since, of all the aspects of sound including frequency, amplitude, and timbre, duration, alone, was also a characteristic of silence. The structure, then, was a division of actual time by conventional metrical means, meter taken as simply the measurement of quantity. ¶In the case of the *Sonatas and Interludes* (which I finished in nineteen forty-eight), only structure was organized, quite roughly for the work as a whole, exactly, however, within each single piece. The method was that of considered improvisation (mainly at the piano, though ideas came to me at some moments away from the instrument. The materials, the piano preparations, were chosen as one chooses shells while walking along a beach. The form was as natural as my taste permitted: so that where, as in all of the *Sonatas* and two of the *Interludes*, parts were to be repeated, the formal concern was to make the progress from the end of a section to its beginning seem inevitable. ¶The structure of one of the *Sonatas*, the fourth, was one hundred measures of two-two time, divided into ten units of ten measures each. These units were combined in the proportion three, three, two, two, to give the piece large parts, and they were subdivided in the same proportion to give small parts to each unit. In contrast to a structure based on the frequency aspect of sound, tonality, that is, this rhythmic structure was as hospitable to nonmusical sounds, noises, as it was to those of the conventional scales and instruments. For nothing about the structure was determined by the materials which were to occur in it; it was conceived, in fact, so that it could be as well expressed by the

absence of these materials as by their presence. ¶In terms of the opposition of freedom and law, a piece written ten years before the *Sonatas and Interludes, Construction in Metal*, presents the same relationship, but reversed: structure, method, and materials were all of them subjected to organization. The morphology of the continuity, form, alone was free. Drawing a straight line between this situation and that presented by the later work, the deduction might be made that there is a tendency in my composition means away from ideas of order towards no ideas of order. And though when examined the history would probably not read as a straight line, recent works, beginning with the *Music of Changes*, support the accuracy of this deduction. ¶For, in the *Music of Changes*, the note-to-note procedure, the method, is the function of chance operations. And the structure, though planned precisely as those of the *Sonatas and Interludes*, and more thoroughly since it encompassed the whole span of the composition, was only a series of numbers, three, five, six and three quarters, six and three quarters, five, three and one eighth, which became, on the one hand, the number of units within each section, and, on the other, number of measures of four-four within each unit. At each small structural division in the *Music of Changes*, at the beginning, for example, and again at the fourth and ninth measures and so on, chance operations determined stability or change of tempo. Thus, by introducing the action of method into the body of the structure, and these two opposed in terms of order and freedom, that structure became indeterminate: it was not possible to know the total time-length of the piece until the final chance operation, the last toss of coins affecting the rate of tempo, had been made. Being indeterminate, though still present, it became apparent that structure was not necessary, even though it had certain uses. ¶One of these uses was the determination of density, the determination, that is, of how many of the potentially present eight lines, each composed of sounds and silences, were actually to be present within a given small structural part. ¶Another use of the structure affected the charts of sounds and silences, amplitudes, durations, potentially active in the continuity. These twenty-four charts, eight for sounds and silences, eight for amplitudes, eight for durations, were, throughout the course of a single structural unit, half of them mobile and half of them immobile. Mobile meant that once any of the elements in a chart was used it disappeared to be replaced by a new one. Immobile meant that though an element in a chart had been used, it remained to be used again. At each unit structural point, a chance operation determined which of the charts, numbers one, three, five, and seven or numbers two, four, six, and eight, were mobile and which of the charts were immobile—not changing.

¶The structure, therefore, was in these respects useful. Furthermore, it determined the beginning and

ending of the compositional process. But this process, had it in the end brought about a division of parts the time-lengths of which were proportional to the original series of numbers, would have been extraordinary. And the presence of the mind as a ruling factor, even by such an extraordinary eventuality, would not have been established. For what happened came about only through the tossing of coins. ¶It became clear, therefore, I repeat, that structure was not necessary. And, in *Music for Piano,* and subsequent pieces, indeed, structure is no longer a part of the composition means. The view taken is not of an activity the purpose of which is to integrate the opposites, but rather of an activity characterized by process and essentially purposeless. The mind, though stripped of its right to control, is still present. What does it do, having nothing to do? And what happens to a piece of music when it is purposelessly made? ¶What happens, for instance, to silence? That is, how does the mind's perception of it change? Formerly, silence was the time lapse between sounds, useful towards a variety of ends, among them that of tasteful arrangement, where by separating two sounds or two groups of sounds their differences or relationships might receive emphasis; or that of expressivity, where silences in a musical discourse might provide pause or punctuation; or again, that of architecture, where the introduction or interruption of silence might give definition either to a predetermined structure or to an organically developing one. Where none of these or other goals is present, silence becomes something else—not silence at all, but sounds, the ambient sounds. The nature of these is unpredictable and changing. These sounds (which are called silence only because they do not form part of a musical intention) may be depended upon to exist. The world teems with them, and is, in fact, at no point free of them. He who has entered an anechoic chamber, a room made as silent as technologically possible, has heard there two sounds, one high, one low—the high the listener's nervous system in operation, the low his blood in circulation. There are, demonstrably, sounds to be heard and forever, given ears to hear. Where these ears are in connection with a mind that has nothing to do, that mind is free to enter into the act of listening, hearing each sound just as it is, not as a phenomenon more or less approximating a preconception.

¶What's the history of the changes in my composition means with particular reference to sounds? I had in mind when I chose the sounds for *Construction in Metal* that they should be sixteen for each player. The number sixteen was also that of the number of measures of four-four in each unit of the rhythmic structure. In the case of the structure this number was divided four, three, two, three, four; in the case of the materials the gamuts of sixteen sounds were divided into four groups of four. The plan, as preconceived, was to use four of the sounds in the first sixteen measures, introducing in each succeeding structural unit four more until the exposition involving all sixteen and lasting through the first four units was completed. The subsequent parts, three, two, three, four, were composed

as development of this initial situation. In actuality, this simple plan was not realized, although it was only recently that I became fully aware that it was not. I had known all along that one of the players used three Japanese temple gongs rather than four, but the fact that only three of these relatively rare instruments were then available to me, together with the attachment I felt towards their sound, had convinced me of the rightness of this change in number. More serious, however, it seems to me now, was the effect of beaters: playing cowbells first with rubber and then with metal multiplied by two the number of sounds actually used. Sirenlike piano trills which sound as one were counted as two. Various other deviations from the original plan could be discovered on analysis: for instance, the addition of metal thundersheets for background noise bringing the number sixteen, for those players who enjoyed it

to seventeen. One might conclude that in composing *Construction in Metal* the organization of sounds was imperfectly realized. Or he might conclude that the composer had not actually listened to the sounds he used. ¶I have already compared the selection of the sounds for the *Sonatas and Interludes* to a selection of shells while walking along a beach. They are therefore a collection exhibiting taste. Their number was increased by use of the *una corda*, this pedal bringing about alterations of timbre and frequency for many of the prepared keys. In terms of pitch, however, there is no change from the sounds of the *Construction*. In both cases a static gamut of sounds is presented, no two octaves repeating relations. However, one could hear interesting differences between certain of these sounds. On depressing a key, sometimes a single frequency was heard. In other cases depressing a key produced an interval; in still others an aggregate of pitches and timbres. Noticing the nature of this gamut led to selecting a comparable one for the *String Quartet:* the inclusion there of rigidly scored conventional harmonies is a matter of taste, from which a conscious control was absent. Before writing the *Music of Changes*, two pieces were written which also used gamuts of sounds: single sounds, double sounds and others more numerous, some to be played simultaneously, others successively in time. These pieces were *Sixteen Dances* and *Concerto for Prepared Piano and Chamber Orchestra*. The elements of the gamuts were arranged unsystematically in charts and the method of composition involved moves on these charts analagous to those used in constructing a magic square. Charts were also used for the *Music of Changes*, but in contrast to the method which involved chance opera-

tions, these charts were subjected to a rational control: of the sixty-four elements in a square chart eight times eight (made in this way in order to interpret as sounds the coin oracle of the Chinese *Book of Changes*) thirty-two were sounds, thirty-two silences. The thirty-two sounds were arranged in two squares one above the other, each four by four. Whether the charts were mobile or immobile, all twelve tones were present in any four elements of a given chart, whether a line of the chart was read horizontally or vertically. Once this dodecaphonic requirement was satisfied, noises and repetitions of tones were used with freedom.

One may conclude from this that in the *Music of Changes* the effect of the chance operations on the structure

(making very apparent its anachronistic character)

was balanced by a control of the materials. Charts remain in the *Imaginary Landscape Number IV*, and in the *Williams Mix*, but, due to the radios of the first piece and the library of recorded sounds of the second, and for no other reason, no twelve-tone control was used. The question "How do we need to cautiously proceed in dualistic terms?" was not consciously answered until the *Music for Piano*. In that piece notes were determined by imperfections in the paper upon which the music was written. The number of imperfections was determined by chance.

The original notation is in ink, and the actual steps that were taken in composition have been described in an article in *Die Reihe*. ¶Though in the *Music for Piano* I have affirmed the absence of the mind as a ruling agent from the structure and method of the composing means, its presence with regard to material *is* made clear on examining the sounds themselves: they are only single tones of the conventional grand piano, played at the keyboard, plucked or muted on the strings, together with noises inside or outside the piano construction. The limited nature of this universe of possibilities makes the events themselves comparable to the first attempts at speech of a child or the fumblings about of a blind man. The mind reappears as the agent which established the boundaries within which this small play took place. Something more far-reaching is necessary: a composing of sounds within a universe predicated upon the sounds themselves

rather than upon the mind which can envisage their coming into being. ¶Sounds, as we know, have frequency, amplitude, duration, timbre, and in a composition, an order of succession. Five lines representing these five characteristics may be drawn

in India ink upon transparent plastic squares. Upon another such square a point may be inscribed. Placing the square with the lines over the square with the point, a determination may be made as to the physical nature of a sound

and its place within a determined program simply by dropping a perpendicular from the point to the line and measuring according to any method of measurement. Larger points will have the meaning of intervals and largest points that of aggregates. In order to make the several measurements necessary for intervals and aggregates, further squares having five lines are made and the meaning of any of the lines is left undetermined, so that a given one refers to any of the five characteristics. These squares are square so that they may be used in

any position with respect to one another. This describes the situation obtaining

in a recent composition, *Variations*, the composing means itself one of the eighty-four occurring in the part for piano of *Concert for Piano and Orchestra*. In this situation, the universe within which the action is to take place is not preconceived. Furthermore, as we know, sounds are events in a field of possibilities, not only at the discrete points conventions have favored. The notation of *Variations* departs from music and imitates the physical reality. ¶It is now my intention to relate the history of the changes with regard to duration of sounds in my composing means. Beyond the fact that in the *Construction in Metal* there was a control of duration patterns parallel to that of the number of sounds chosen, nothing unconventional took place. Quantities related through multiplication by two or addition of one-half together with grupettos of three, five, seven, and nine were present. The same holds for the *Sonatas and Interludes*, though no rhythmic patterns were rationally controlled. In the *String Quartet* the rhythmic interest drops, movements being nearly characterized by the predominance of a single quantity. Not until the *Music of Changes* do the quantities and their notation change. They

are there measured in space, a quarter note equalling two and one-half centimeters. This made possible the notation of a fraction, for example one-third of an eighth, without the necessity of notating the remainder of the fraction, the remaining two-thirds, following the same example. This possibility is directly analogous to the practice of cutting magnetic tape. In the duration charts of the *Music of Changes* there were sixty-four elements, all of them durations since they were both

applicable

to sound and silence (each of which had thirty-two elements). These were segmented (for example one-half plus one-third of an eighth plus six-sevenths of a quarter) and were expressible wholly or in part. This segmentation was a practical measure taken to avoid the writing of an impossible situation which might arise during a high density structural area due to the chance operations. ¶The same segmentation of durations took place in the *Williams Mix*, since a maximum of eight machines and loudspeakers had been pre-established. When the density rose from one to sixteen, it was often necessary to express durations by their smallest parts, there being no room left on the tape for the larger segments. ¶Exact measurement and notation

of durations is in reality mental:

imaginary exactitude. In the case of tape, many

circumstances enter which ever so slightly, but nonetheless profoundly, alter the intention (even though it was only the carrying out of an action indicated by chance operations). Some of these circumstances are the effects of weather upon the material; others follow from human frailty—the inability to read a ruler and make a cut at a given point—still others are due to mechanical causes, eight machines not running at precisely the same speed. ¶Given these circumstances, one might be inspired towards greater heights of duration control or

he might renounce the need to control durations at all. In *Music for Piano* I took the latter course. Structure no longer being present, that piece took place in any length of time whatsoever, according to the exigencies of an occasion. The duration of single sounds was therefore also left indeterminate. The notation took the form of whole notes in space, the space suggesting but not measuring time. Noises were crotchets without stems. ¶When a performance of *Music for Piano* involves more than one pianist, as it may from two to twenty, the succession of sounds becomes completely indeterminate. Though each page is read from left to right conventionally, the combination is unpredictable in terms of succession. ¶The history of changes with reference to timbre is short. In the *Construction in Metal* four sounds had a single timbre; while the prepared piano of the *Sonatas and Interludes* provided by its nature a *klangfarbenmelodie*. This interest in changing timbres is evident in the *String Quartet*. But this matter of timbre, which is largely a question of taste, was first radically changed for me in the *Imaginary Landscape Number IV*. I had, I confess, never enjoyed the sound of radios. This piece opened my ears

to them, and was essentially a giving up of personal taste about timbre. I now frequently compose with the radio turned on, and my friends are no longer embarrassed when visiting them I interrupt their receptions. Several other kinds of sound have been distasteful to me: the works of Beethoven, Italian *bel canto*, jazz, and the vibraphone. I used Beethoven in the *Williams Mix*, jazz in the *Imaginary Landscape Number V*, *bel canto* in the recent part for voice in the *Concert for Piano and Orchestra*. It remains for me to come to terms with the vibraphone. In other words, I find my taste for timbre

lacking in necessity, and I discover that in the proportion I give it up, I find I hear more and more accurately. Beethoven now is a surprise, as acceptable to the ear as a cowbell. What are the orchestral timbres of the *Concert for Piano and Orchestra*? It is impossible to predict, but this may be said: they invite the timbres of jazz, which more than serious music has explored the possibilities of instruments. ¶With tape and music-synthesizers, action with the overtone structure of sounds can be less a matter of taste and more thoroughly an action in a field of possibilities. The notation I have described for *Variations* deals with it as such.

¶The early works have beginnings, middles, and endings. The later ones do not. They begin anywhere, last any length of time, and involve more or fewer instruments and players. They are therefore not preconceived objects, and to approach them as objects is to utterly miss

the point. They are occasions for experience, and this experience is not only received by the ears but by the eyes too. An ear alone is not a being. I have noticed listening to a record

that my attention moves to a moving object or a play of light, and at a rehearsal of the *Williams Mix* last May when all eight machines were in operation the attention of those present was engaged by a sixty-year-old piano tuner who was busy tuning the instrument for the evening's concert. It becomes evident that music

itself is an ideal situation, not a real one. The mind may be used either to ignore ambient sounds, pitches other than the eighty-eight, durations which are not counted, timbres which are unmusical or distasteful, and in general to control and understand an available experience. Or the mind may give up its desire to improve on creation and function as a faithful receiver of experience. ¶I have not yet told any stories and yet when I give a talk I generally do. The subject certainly suggests my telling something irrelevant but my inclination is to tell something apt. That reminds me: Several years ago I was present at a lecture given by Dr. Daisetz Teitaro Suzuki. He spoke quietly when he spoke. Sometimes, as I was telling a friend yesterday evening, an airplane would pass overhead. The lecture was at Columbia University and the campus is directly in line with the departure from La Guardia of planes bound for the west. When the weather was good, the windows were open: a plane passing above drowned out Dr. Daisetz Teitaro Suzuki. Nevertheless, he never raised his voice, never paused, and never informed his listeners of what they missed of the lecture, and no one ever asked him what he had said while the airplanes passed above. Anyway, he was explaining one day the meaning of a Chinese character—Yu, I believe it was—spending the whole time explaining it and yet its meaning as close as he could get to it in English was "unexplainable." Finally he laughed and then said, "Isn't it strange that having come all the way from Japan I spend my time explaining to you that which is not to be explained?" ¶That was not the story I was going to tell when I first thought I would tell one, but it reminds me of another.

Years ago when I was studying with Arnold Schoenberg someone asked him to explain his technique of twelve-tone composition. His reply was immediate: "That is none of your business." ¶Now I remember the story I was going to tell when I first got the idea to tell one. I hope I can tell it well. Several men, three as a matter of fact, were out walking one day, and as they were walking along and talking one of them noticed another man standing on a hill ahead of them. He turned to his friends and said, "Why do you think that man is standing up there on that hill?" One said, "He must be up there because it's cooler there and he's enjoying the breeze." He turned to another and repeated his question, "Why do you think that man's standing up there on that hill?" The second said, "Since the hill is elevated above the rest of the land, he must be up there in order to see something in the distance." And the third said, "He must have lost his friend and that is why he is standing there alone on that hill." After some time walking along, the men came up the hill and the one who had been standing there was still there: standing there. They asked him to say which one was right concerning his reason for standing where he was standing. ¶"What reasons do you have for my standing here?" he asked. "We have three," they answered. "First, you are standing up here because it's cooler here and you are enjoying the breeze. Second, since the hill is elevated above the rest of the land, you are up here in order to see something in the distance. Third, you have lost your friend and that is why you are standing here alone on this hill. We have walked this way; we never meant to climb this hill; now we want an

answer: Which one
of us is right?"
¶The man answered,
"I just stand." ¶When
I was studying
with Schoenberg
one day as he was
writing some
counterpoint to
show the way to
do it, he used
an eraser.
And then while he
was doing this

he said, "This end
of the pencil
is just as im-
portant as the
other end." I
have several
times in the course
of this lecture
mentioned ink. Com-
posing, if it
is writing notes,
is then actu-
ally writing,
and the less one
thinks it's thinking
the more it be-
comes what it is:
writing. Could mu-
sic be composed
(I do not mean
improvised) not
writing it in
pencil or ink?

The answer is
no doubt Yes and
the changes in
writing are pro-
phetic. The *So-
natas and In-
terludes* were com-
posed by playing
the piano,
listening to
differences,
making a choice,
roughly writing
it in pencil;
later this sketch
was copied, but
again in pen-
cil. Finally
an ink manuscript
was made care-
fully. The *Mu-
sic of Changes*
was composed in
almost the same
way. With one change:
the origi-
nal pencil sketch
was made exact-
ly, an era-
ser used whenev-
er necessar-
y, elimin-
ating the need
for a neat pen-
cil copy. In
the case of the
*Imaginar-
y Landscape Num-
ber IV*, the first
step of playing
the instrument
was elimin-
ated. The oth-
ers kept. *Music
for Piano*
was written di-
rectly in ink.

The excessively small type in the following pages is an attempt to emphasize the intentionally pontifical character of this lecture.

II. Indeterminacy

This is a lecture on composition which is indeterminate with respect to its performance. The *Klavierstück XI* by Karlheinz Stockhausen is an example. *The Art of the Fugue* by Johann Sebastian Bach is an example. In *The Art of the Fugue*, structure, which is the division of the whole into parts; method, which is the note-to-note procedure; and form, which is the expressive content, the morphology of the continuity, are all determined. Frequency and duration characteristics of the material are also determined. Timbre and amplitude characteristics of the material, by not being given, are indeterminate. This indeterminacy brings about the possibility of a unique overtone structure and decibel range for each performance of *The Art of the Fugue*. In the case of the *Klavierstück XI*, all the characteristics of the material are determined, and so too is the note-to-note procedure, the method. The division of the whole into parts, the structure, is determinate. The sequence of these parts, however, is indeterminate, bringing about the possibility of a unique form, which is to say a unique morphology of the continuity, a unique expressive content, for each performance.

The function of the performer, in the case of *The Art of the Fugue*, is comparable to that of someone filling in color where outlines are given. He may do this in an organized way which may be subjected successfully to analysis. (Transcriptions by Arnold Schoenberg and Anton Webern give examples pertinent to this century.) Or he may perform his function of colorist in a way which is not consciously organized (and therefore not subject to analysis)—either arbitrarily, feeling his way, following the dictates of his ego; or more or less unknowingly, by going inwards with reference to the structure of his mind to a point in dreams, following, as in automatic writing, the dictates of his subconscious mind; or to a point in the collective unconscious of Jungian psychoanalysis, following the inclinations of the species and doing something of more or less universal interest to human beings; or to the "deep sleep" of Indian mental practice—the Ground of Meister Eckhart—identifying there with no matter what eventuality. Or he may perform his function of colorist arbitrarily, by going outwards with reference to the structure of his mind to the point of sense perception, following his taste; or more or less unknowingly by employing some operation exterior to his mind: tables of random numbers, following the scientific interest in probability; or chance operations, identifying there with no matter what eventuality.

The function of the performer in the case of the *Klavierstück XI* is not that of a colorist but that of giving form, providing, that is to say, the morphology of the continuity, the expressive content. This may not be done in an organized way: for form unvitalized by spontaneity brings about the death of all the other elements of the work. Examples are provided by academic studies which copy models with respect to all their compositional elements: structure, method, material, and form. On the other hand, no matter how rigorously controlled or conventional the structure, method, and materials of a composition are, that composition will come to life if the form is not controlled but free and original. One may cite as examples the sonnets of Shakespeare and the *haikus* of Basho. How then in the case of the *Klavierstück XI* may the performer fulfill his function of giving form to the music? He must perform his function of giving form to the music in a way which is not consciously organized (and therefore not subject to analysis), either arbitrarily, feeling his way, following the dictates of his ego, or more or less unknowingly, by going inwards with reference to the structure of his mind to a point in dreams, following, as in automatic writing, the dictates of his subconscious mind; or to a point in the collective unconscious of Jungian psychoanalysis, following the inclinations of the species and doing something of more or less universal interest to human beings; or to the "deep sleep" of Indian mental practice—the Ground of Meister Eckhart—identifying there with no matter what eventuality. Or he may perform his function of giving form to the music arbitrarily, by going