IV.

To my knowledge I am the only one of the composers of my generation who has thoroughly and consistently practiced what is called "serialism", and I have been blamed a) for doing it at all, b) for doing it too late, and c) for still being at it.

In order to somewhat clarify my position I should like to begin by explaining what I understand by serialism. Discussing this concept today one easily feels like talking in a vacuum, for nearly all of the early practitioners of this manner of writing music have decided that it has become completely obsolete. But when these same composers developed the new ideas of serialism, they said the same things about the twelve-tone technique while still applying it in their new efforts. On the other hand we can read in up-to-date criticism early dodecaphonic music being referred to as "serial".

As in so many cases, the confusion is due to non-committal throwing around hazily defined terminology. Nowadays it is -- or should be -- elementary common knowledge that the fundamental concept of the twelve-tone technique is the organization of the tonal material in a set of basic patterns prior to the act of developing individual musical ideas from the material so preorganized, this act being what is understood by "composing music". The preorganization of the material consists in arranging the twelve different pitches (or "pitch classes" -- for every pitch has a replica in each of the octaves we take into account)availabe in our tonal system in one of the millions of possible orders of succession. The chosen order, called twelve-tone row, or series, then becomes the model, mold, germ cell, fountain head, center of reference, store house, or what you may call it, from which all that happens in the piece of music is derived. On these grounds music so composed may be called "serial".

During the first two decades after Arnold Schoenberg had invented this technique and made it public about 1925, only very few composers apart from Schoenberg's personal disciples, Alban Berg and Anton Webern, followed him into this difficult and lonely territory. Not only did he not encourage general knowledge of his

new technique, keeping it mainly to himself until his late American years when he started discussing it in public, but above all, during that period neo-classicism of Stravinskyan or Hindemithian observance dominated the world scene of contemporary music, both styles considerably easier to imitate and more promising of tangible success than the twelve-tone technique. As mentioned before, I turned to this compositional discipline around 1930 when I embarked on the project of Charles V.

To everybody's surprise it came to light at the end of World War II that knowledge of the technique must have spread so-to-speak underground in spite of the interruption of normal ways of communication, for suddenly numerous young composers turned up all over the world presenting dodecaphonic essays. The most important event, however, was the discovery that a new perspective had been brought into the picture.

It had started with the studies pursued by the French composer, Olivier Messiaen, of rhythmic patterns which he called "modes" in analogy to the rhythmic modes of mediaeval music. These, in turn, had been derived from the prosodic theories of ancient poetry. The idea of setting up groups of durations to be applied to sequences of tones has also its prototype in the isorhythmic procedures of the Ars nova of the fourteenth century when melodic configurations were forced into pre-established rhythmic molds. Eventually Messiaen and some of his pupils - among them above all Pierre Boulez and Karlheinz Stockhausen -- connected the preorganization of durational sequences with that of pitch successions. This is the beginning of what should properly be called "serial" music. In this light the twelve-tone technique may be seen as one particular province of serialism; but for the sake of clarity it would be desirable to reserve the term "serial" to the music in which the concept of serial preorganization applies to more than just one aspect of the musical process.

In parentheses we may notice that these ideas, as it frequently happens with new notions of great consequence, were "in the air" and ready to materialize wherever alert minds could sense them. The American composer, Milton Babbitt, had already in the 1940s written music in which the manipulation of time series was integrated with dodeca-

phonic procedure, but nobody paid much attention to such endeavors. While in Europe innovations of this kind are quickly formulated in "manifestos" and widely discussed in all coffeehouses (which admittedly have some drawbacks), in this country they are more or less ignored because of the low esteem in which intellectual pursuits are generally held and because there are no coffeehouses.

Eventually the idea of arranging series of discrete, numerically measurable values was applied to other, and possibly all aspects of the music: dynamics, register, density, timbre. The young composers introduced the term "parameter" to designate these variables. It is symptomatic for the general frame of mind of this generation that they loved to use in their theorizing a terminology borrowed from the exact sciences even when they did not understand it correctly, as was pointed out by horrified mathematicians and physicists. It reveals a tendency toward detaching music from traditional emotional implications that were felt embarrassing. This too has precedents. We remember that music in the mediaeval classification of the arts was listed among the sciences of proportion and measurement, instead of the arts of communication.

When after an absence of thirteen years I began to travel to Europe again in 1950, I had, among other engagements, an invitation to give lectures and seminars at the summer music institute in Darmstadt, and there I became more thoroughly acquainted with serialism. I gladly confess that I actively approached this technique motivated chiefly by curiosity, and in my opinion there is nothing wrong with this. Progressive composers have routinely been blamed for experimenting with new ideas, new sounds, new instruments, new techniques, new designs "just for newness' sake", instead of being driven to it by "inner necessity" or, probably still better, not at all. I feel that it is perfectly legitimate for a composer to look for something new and different just because it is new and different, and he should stop apologizing for being curious.

I realized that in my Twelve Variations for piano and my Sixth String Quartet, written in 1936 and 1937, I had touched upon expanding dodecaphonic procedure in a new direction by programming

the distribution of the forty-eight basic shapes of the twelve-tone row over the total area of the composition. This might be interpreted as foreshadowing serial procedure because here a so-to-speak abstract ordering of elements of the material other than single pitches is precompositionally imposed upon the overall design, determining in advance what configurations of tones will appear at certain points or areas. But at that time I seemed to have reached in these works a technical saturation point, and I did not continue on this track. As a matter of fact, during the 1940s I tested various methods of relaxing the strictures of the twelve-tone technique, not foreseeing that a principle which I discovered in those essays and which I called "rotation" would become one of my most productive tools once I joined the serialists.

After my "relaxing" period I was obviously ready for a new encounter with that redoubtable complexity which seemed to be the most durable characteristic of atonal music, and I sensed that serial pre-organization of the parameter of time would produce new heights of complexity.

At the same time I became acquainted with the newly discovered potentialities for musical composition in the electronic medium. Apart from offering new, so far unheard-of sound qualities, its main attraction was the possibility of obtaining degrees of rhythmic accuracy that could never be demanded of even the best trained live musicians, and that certainly would lure composers intent upon complexity of texture and design.

In my first electronic essay -- the first section of a religious work Spiritus intelligentiae, sanctus -- I constructed an interlude of about three minutes duration. It is, technically speaking, a double canon in that two tone-lined run off simultaneously with their imitations. The fact that these imitations occur not only at different pitch levels (as in the classical canon), but also at different speeds already represents an increment of complexity owed to the property of electronics, for re-recording a given tape at a different pitch level at that time automatically changed the speed of the recorded sounds. To predetermine the durations of the individual tones in the tone-lines I reduced certain measurements

applying to the lenght of the whole interlude proportionately to fit the much shorter phrase units of the canon. The duration of sounds was expressed in centimeters of tape which in those days was running at the extremely high speed of 76 cm (30 inches) per second. At the beginning of the canon my "time series" showed spans of 48, 107, 59, 9, 80, 45, 8, and 156 cm, which, if combined with one or two more strands having similar time spans, results in a degree of rhythmic complexity that leaves little to be desired. If these stretches of tape are expressed in standard clock time on the basis of 76 cm per second, we obtain the following time values: 0.63, 1.4, 0.77, 0.118, 1.05, 0.59, 0.105, and 2.05 seconds. Not only is it impossible to represent such a sequence of time values by means of conventional notation, or to devise for the purpose a manageable new notation, but above all accurate execution of these fractions of seconds is absolutely beyond the capacity of live musicians, whereas cutting 48 cm from a tape on which the first sound was recorded, 107 cm from the second tape, and so on, and splicing these pieces together is a childishly easy, if laborious and inordinately time-consuming operation.

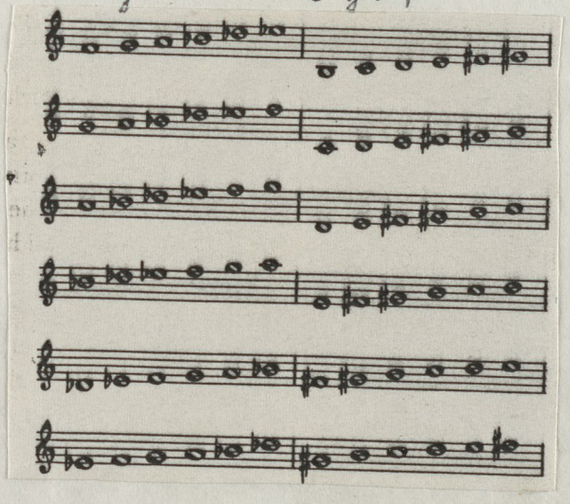
Going one step further, I was looking for some principle by which time values to be assigned to the sounds could be derived from the twelve-tone row that was still considered the ideal center of reference for the whole work, the powerhouse generating all impulses that would innervate the remotest details of the piece, the nucleus containing in empryonic shapes all Gestalt to be developed in the course of the composition. To think of the work as of a unified musical universe unfolding from one basic figure according to one all-permeating law derived therefrom was a philosophical concept inherited from the founding fathers, hallowed and not subject to doubt.

Because time measurements had to be expressed in numerical values it was necessary to find such values in the tone-row. The only feature of the row that obviously lends itself to

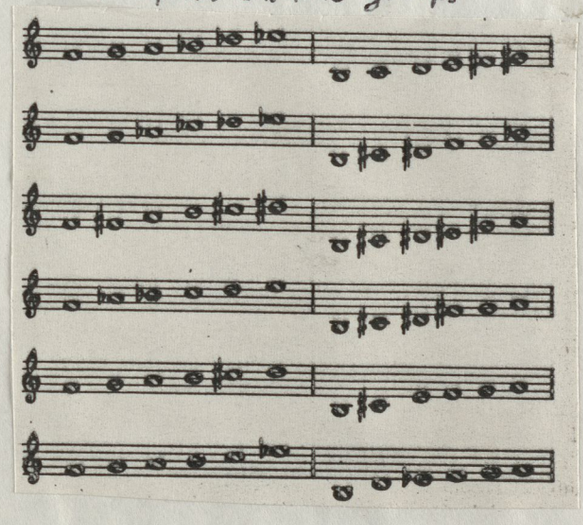
the purpose is the intervals between the successive tones. These may be measured in terms of the half-steps they comprise (for instance, reading upward: D to F = three half-steps, namely: D-D to D-sharp, D-sharp to E, E to F; or D to A-flat = six half-steps, D to C-sharp = eleven half-steps), or by taking into account the ratios of successive frequencies (2/3 for the fifth, 3/4 for the fourth, and so on). I preferred the first method because I wanted to write music for live interpreters and the second method seemed again to produce too complicated fractions. At the same time I was aware of the danger that a consistently straightforward coordination of tone- and time-patterns might lead to permanent recurrence of identical situations and thus create undesirable repetitiousness.

The solution was suggested by the principle of "rotation" that I had tentatively developed years before. Since the term "Rotation" in later serial theory was used to describe certain procedures involving graphical motions of notational shapes on the music paper, my device should perhaps more correctly called a special form of permutation. In my choral work, Lamentatio Jeremiae Prophetae, writeen in 1941, I divided my tone-row in two scale-like six-tone groups, and from each of these groups I derived five additional patterns by putting consecutivaly the first tone of each at the end of the next. Of course, all of these six patterns would contain only the same six tones. I derived another set of patterns by transposing the five new ones to begin with the initial tone of the original. This process would gradually introduce the six tones left out in the first set.

Original six-tone groups



Transposed six-tone groups



As pointed out earlier, this concept was meant to relax the rigidity of the twelve-tone technique, as I had known it thus far. In my new system of patterns I could occasionally use only those having the same six tones or, at will, add one or more of the other groups to enlarge my pitch resources. Thus I felt that I could develop a richer palette of harmonic hues, a greater variety of characteristic sounds than when I was forced to constantly use up all twelve tones, and yet remain faithful to the basic tenets of the technique. In other works of the 1940s I used this escape hatch by applying the rotational device to groups of less than six tones. Obviously this leads soon enough to giving up the twelve-tone mechanics entirely. The resulting music sounded "twelve-tonish" enough because my mind was steeped in this style through many years of practicing it. I came to the conclusion that arriving at this kind of "liberated" music was perhaps the real purpose of having experienced the stricter forms of dodecaphony.

When, in the 1950s, I felt the urge to undergo a new discipline, it turned out to be much stricter than the old one. To begin with, I elaborated on the idea of rotation, setting up derivative forms of the series by having adjecent tones systematically switch their places. To illustrate: when the original order of the tones was

1 2 3 4 5 6 7 8 9 10 11 12,

I would build a secondary row, reading

1 3 2 5 4 7 6 9 8 11 10 12

followed by 3 1 5 2 7 4 9 6 11 8 12 10,

and 3 5 1 7 2 9 4 11 6 12 8 10,

and so forth. If a mild pun is permissible, one might call this procedure "progressive retrogression". I applied in an orchestral composition Circle, Chain and Mirror, in which I again carefully programmed the disdtribution of these derivative rows throughout the whole work, which resulted in some curious structural symmetries of which I might not have thought without this planning.

Only now I felt ready for total serialization of all parameters. In 1957 I was invited to hold the Christian Gauss Seminars in Criticism at the University of Princeton, and when I discussed serial composition, Professor R. P. Blackmur, who faithfully attended

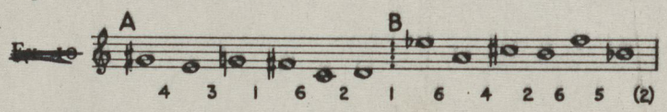
all sessions, brought to my attention the ancient poetic form of the sestina, which I had not known. It fascinated me a great deal, and I decided to use this model of poetic structure as a diving board for the plunge I had myself prepared for.

The sestina is a poem of six stanzas, each of which has six lines. The words that stand at the end of the lines are the same in each stanza, but their order of succession changes. If it is in the

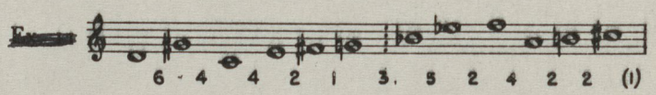
first stanza	1 2 3 4 5 6,
it will be in the second	6 1 5 2 4 3,
in the third	3 6 4 1 2 5,
in the fourth	5 3 2 6 1 4,
in the fifth	4 5 1 3 6 2,
and in the last	2 4 6 5 3 1.

It is easy to see that one more application of the same switching principle will lead back to the first sequence.

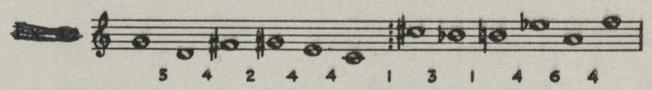
The music of my *Sestina* is based on a twelve-tone row divided into two groups of six tones each:



The figures indicate the size of the intervals measured in half-steps. These tone-rows are rotated according to the principle of the sestina so that the second A- and B-groups read:



The third line is:



and so forth. The tones are always placed so that they will not exceed the ambitus of the original row and the intervals (indicated by the numbers below the staff) are so measured up or down that their magnitudes will not exceed the figure 6. Obviously the sequence of these intervallic magnitudes constantly changes as a result of the rotation of the tones prescribed by the sestina pattern, but these changes are of a different order.

The durations of the tones of the whole composition are derived from these magnitudes in the following manner: each intervallic magnitude corresponds to a time segment which contains as many basic time units as the interval figure indicates. Consequently the first time segment has four units, the second three, etc. Each segment has as many tones as it has units (4, 3, etc.). The duration of the individual tones is determined by a subdivision based on the same serial sequence of magnitudes. If the first segment contains four units and four tones, its subdivision is based on the first four values of the original series: 4 3 1 6. The sum of these being 14, the subdivision unit within the first segment is 4/14. The durations of the individual tones within the first segment are determined by multiplying 4/14 consecutively by 4, 3, 1, and 6. The

durations,then, are 16/14, 12/14, 4/14, and 24/4 of the basic value.

To facilitate computations each basic unit is assumed to contain ten micro-units. We arrive at the subdivision of the first segment by dividing 40 (four times ten) by 14. The result is 2.85. This number is multiplied consecutively by 4, 3, 1, and 6. The results are 11.40, 8.55, 2.85, and 17.10. If the work had been realized in the electronic medium, these values could be produced with utmost accuracy. Because it was conceived for live performance, the time values were adjusted as follows: 11.5, 8.5, 3, and 17. If the smallest numerical unit (0.5) is represented by a thirty-second note, the rhythmic shape of the first four tones is:

(Actually in my composition these time values are much shorter because other serial considerations entered the computation; the procedure is far too complcated to be demonstrated here. Another marginal remark: contrary to common belief, knowledge of higher mathematics is no prereqisite for this kind of work, only infinite patience. Some of the results are so startling as to be found rewarding.)

"Density" is the next parameter to be determined serially. There are six degrees of density In "density 1" two tone-groups run off simultaneously, the durations of the individual group being determined by the mechanism described above. In "density 6" twelve such starnds run off at the same time. Another parameter regulated serially is the location of the tones within the gamut of six octaves designated as the ambitus of the work.

The structural layout is so devised that each "rotated" version of any six-tone group will combine once with every other. Thus the music of the first stanza is based on the first statement of the A-group, whichin each subsequent line of the stanza is combined with one of the forms of the B-group rotated from B 1 to B 6. The second stanza has A 2, combined again with all B-groups, but now in a different sequence, according to line 2 of the sestina pattern: B 6, B 1, B 5, B 2, B 4, B 3; and so forth.

It is characteristic of all these operations that systems of constant magnitudes are constantly and according to plan combined with constantly changing sets of magnitudes so that constantly new situations arise. Whatever happens in the course of the work is the result of predetermination, but at the same time,because of its complexity, largely unpredictable, except perhaps by feeding the relevant information into a computer. To illustrate: if the succession of tones is determined by serial regulation (as is the case in the "classical" twelve-tone technique) and, in addition to this, the timing of the entrance into the musical process of these tones is also predeterminated by serial calculation, it is no longer possible to decide "freely" (that is, by "inspiration") which tones should sound simultaneously at any given point. Whatever happens in this parameter, is a product of the preconceived serial organization, but by the same token it is a chance occurrence because it is as such not anticipated by the mind that invented the mechanism and set it in motion. The unexpected happens by necessity.

The dialectical cohabitation of predetermination and chance appeared to me as one of the essential features of serialism in music. It is the dominant ides of the poem that I wrote for my Sestina, and it has haunted me ever since. Having tasted blood, I applied what I had learned in the Sestina with a vengeance in an orchestral work with the Latin title Quaestio temporis -- a question of time. The computations required for the determination of time values follow principles similar to those of the Sestina, but they are more involved. Many of these intricacies are due to exploiting the arithmetical implications of the numerical difference between 11 and 12, for in this work I used a tone-row that not only included all twelve pitch classes, but also all eleven intervals available within an octave.

The idea of the "all-interval" series had preoccupied me ever since I started working in the twelve-tone technique, and I consulted many mathematicians about a formula for constructing such tone-rows. They usually smiled indulgently at so elementary a problem, then declared that it would take a little more thinking, and after that were not heard from again. The problem has been solved by some

elaborate mathmatical operations described by Herbert Eimert in his definitive book on serialism. When I discussed it in the 1940s with my physicists friends at Los Alamos, they found it to be perfect nourishment for the early computer they were building. Since then properly programmed computers have solved it mechanically in various places and have furnished complete tables of all conceivable all-interval rows.

One of the most important insights gained from my serial work was that this technique radically changed the character of our music. Since music in the age of the Renaissance had acquired communicative functions, listeners developed the habit and consequently the urge to interpret musical phenomena to which they were exposed as communication of sentiments and ideas. Music was understood to be some kind of language, and in its structural properties it took on many characteristics of speech. Theorists began to use such terms as "phrase", "sentence", "period", "question and answer", "subject", and "logic". The perfect musical work was seen as having a clearly defined theme that was logically developed, a structure that could be followed from point to point, from beginning to end.

The first symptom of music's alienation from its speech-like tradition may be seen in the new emergence of the concept of retrogression in later twelve-tone music. While the systematical layout of the roster of available forms of the tone-row calls for the introduction of its retrograde, the notion of turning around not only the tone-row as a basic element, but also complete musical ideas and even building circular structures that would run back into their beginnings was developed by Webern and other, later dodecaphonists. I have writte a number of such pieces. Retrogression is foreign to speech as well as to the speech-like music since 1600; palindromes are contrived only as hilarious stunts, canons in <u>cancrizans</u> mode are rare and were put together mainly to exhibit erudition. In mediaeval music, however, retrogression is an entirely familiar device. In our modern use it takes on some vaguely philosophical undertones because it seems to suggest that time might be reversible.

Because in serial music Gestalt is the result of orderings made prior to its creation, the free-wheeling inspirational invention of "themes" is virtually impossible, which also eliminates the concept of "development". Thus the perception of serial music rests upon different premises. The interest that it evokes emanates from what it has to offer at any moment rather than from a context that may be followed intellectually by the listener's retaining in his memory musical shapes and profiles to be recognized later on. It is therefore, contrary to common belief, intellectually much less demanding than traditional music. Whatever structural features the listener seems to observe, is a product of his own mental processes. In this sense it requires more imaginative participation than the old music, but it probably also stimulates the imagination to a higher degree. I realized that the "athematic" quality of serial music was for the younger composers perhaps the strongest bait when they were caught in the serial net, because serialism was the most secure way of preventing relapse into traditional routines. It should be mentioned here that the Tchecoslovakian composer, Alois Haba, promoted and practiced "athematism" already in the early 1920s, even before the twelve-tone technique came to light.

With the two works discussed above I had reached a point of saturation similar to what I had experienced in the twelve-tone technique with my Variations and the Sixth Quartet. But now as then this did not suggest to me that I had exhausted the possibilities of serialism and should turn to something else. I became rather interested in exploring further variants and ramifications of the serial concept. My younger colleagues apparently felt otherwise, and in their circles it has become fashionable to decry serialism as obsolete, or even a dead-end road that should have been avoided. The alarming rapidity with which in our age artistic innovations are dismissed before they have reached fruition seems to due to the hectic pressure exercised by public opinion. I remember seeing a few years ago a newspaper report about one of the international music festivals headlined: "So-and-so Festival: No New Breakthrough". It must be very depressing for the composers represented there to read that they disappointed the critic because they did not stand

on their heads to signal a "breakthrough". Unfortunately many of the young composers seem to have decided to do just that. It is regrettable that a new style is not allowed to mature and to unfold completely its potentialities. We are not aware that anybody pestered Franz Schubert to "break through" the late Beethoven, although he was twenty-eight years his junior. His music was bold enough as it was.

In subsequent serial works I tested various different applications of premeditated measurements, off and on leaving some parameters open to free manipulation while strictly ordering others. A group of small pieces for two pianos has the title Basler Massarbeit, which in German is a double entendre because Massarbeit means both "measured work" and "custom made", and these pieces were written for two friends of mine in Basel, Switzerland. Here the subdivision of the bars, resulting from maneuvering a preconceived time-series, became gradually more complicated and, being different for each of the two instruments, made the execution very tricky -- almost impossible without an optical metronome.

Sechs Vermessene is the title of a set of six piano pieces, and another pun, for "vermessen" means not only"strictly measured" but also "presuming". It recalls one of the lines of my Sestina, which reads: "Is it presuming to force such an extent of measure on life?" In these pieces I stressed the aspects of applying different time patterns to different layers of varying densities. Seeing that preorganization of pitch- and time-successions was leaving the parameter of simultaneities (in traditional terminology: harmonies) indeterminate, I tried in one of the pieces to start with predetermination of just that parameter: constructing from the tone-row a basic material of fifty simultaneities and then organizing these according to pre-established series of time and dynamics. I took this experiment up again on a larger scale in an orchestral work, Perspectives. The title of this composition suggests that various musical configurations arranged in layers are combined at several different levels of dynamics and speed, the perspectivic idea being further emphasized by having some of the elements played offstage. Similar conceits prevail in another orchestral work, called Fivefold Enfoldment.

The paradox that the composer, by most rigorously planning every move in certain areas, is giving up control over others, has increasingly focussed our sttention on the factor of chance. It has become dominant in a great deal of so-called post-serial "aleatory" music. I have never been inclined to abdicating my inventive penchants in favor of some chance mechanism, like throwing dice or flipping coins, because I still find even laborious serial computations more interesting than such primitive exercises. I did become interested in devising musical works in which the interpreter was given multiple choices of combining materials that in themselves were totally worked out by the composer. This procedure seems to reflect a very characteristic trait of the contemporary mind, which is rather skeptical of categorical statements and prefers a pluralistic view allowing of more than one solution to a given problem.

Along these lines I wrote the Fibonacci Mobile for string quartet and piano. It consists of a number of elements whose durations are proportional to the numbers 2 3 5 8 13 21 34. They are a part of the so-called Fibonacci series in which each number is the sum of the two preceding ones. These elements may be combined -- that is, played simultaneously in many different ways, and a performance of the work should present several such combinations so that their differences may be appreciated. The effect should remind one of the aspects of a spatial mobile, which by turning about shows its elements in constantly changing perspectivic relationships.

The orchestral piece From Three Make Seven is of similar nature. Here I composed serially two blocks of music, of forty-two bars each. They are based on a twelve-tone row and all their time measurements are painstakingly worked out. Of either one of these blocks there are two condensed versions, one of twenty-eight, the other of fourteen bars -- which means that the same musical material runs off so much faster, has higher density. Furthermore each of these blocks is available in three different orchestrations: for wind-, string-, and percussive instruments. These eighteen elements have seven points each at which they may

be synchronized. Obviosly countless possibilities exist, and again several of them should be presented in performance. But the selection has to be made beforehand and abided by; nothing is left to improvisation.

It has been objected that this project does not make any sense because the results of the combinations are utterly beyond control, and if the unavoidable chaos was intended, the serial preparation of the material was useless -- one could just as well let everybody play at will. This is, of course, not true. Since the elements are derived from the same substance, they are very closely related in every detail, and many of the possible combinations yield surprising coincidences, correspondences, contrasts,and other relationships. One might say that the arrangement represents a sort of Variations, but of a kind a composer could hardly conceive without sluicing his inventions through the involuted system of serial channels.

In some later works, as for instance in Horizon circled , I tried to introduce a certain degree of chance into an otherwise strictly determined design. Here the piece is divided into time segments (such as used to be called "bars") comprising from one to eleven time units ("beats") of equal length. The number of units in each segment corresponds again to the magnitudes of the intervals of the basic tone-row. All twelve tones of this row or its rotational derivatives are sounded in each segment, which causes the density to vary considerably. The time points at which the tones are to be played within each segment are not precisely defined, but only indicated in relation to other tones. The players are instructed to play their tones approximately according to the graphic poition of the notes in the segment. The purpose of the arrangement is to remove from the music all traces of "squareness" and to obtain a floating character. There are other passages to be played "as fast as possible", strings of random pitches following approximately a graphic outline, and the like.

The emphasis placed upon the element of chance has eventually led to a new golden age of improvisation, including all problematical aspects thereof. Obviously the improvisation in post-serial

is expected to produce a certain stylistic image which will be destroyed if some mischievous or lazy players would "improvise" broken D-major triads. It requires well intentioned, dedicated, and congenial players so steeped in the style of the composer (who becomes more and more an instigator of vaguely delineated musical activity) that they could almost write the music which he omitted to put down on paper. Even in such lucky circumstances experience has shown that musicians in the heat of the battle are likely to fall back onto what they know and remember best, what comes naturally to their fingers. More than once I have heard a composer complain that "they did not improvise correctly"; if he knew so well what would have been "correct", it would have been best for him to write it down. To prevent group improvisation from becoming dull, or missing the stylistic image, one has resorted to more or less detailed instructions and guiding lines, and to testing the results in practice run-throughs. But obviously rehearsed improvisation is a contradiction of itself. In many cases it appears that this kind of activity may be relatively satisfying,or at least entertaining, for the participants, but is rather disappointing and boring for those invited to hear the results.

Something akin to improvisational attitudes has developed in the field of composition in the electronic medium. While one of its initial attractions was the possibility of obtaining otherwise inaccessible degrees of accuracy in time relations, it became later the extraordinary capacity for new sound qualities that absorbed the attention of composers. Since rhythmic subtlety accomplished through ever more complicated serial computations served the purpose of making sure that the result would sound chaotic, we learned that this character could be achieved by simpler means and serial organization reserved for other purposes. On the other hand, the fact that electronic generators will produce any conceivable frequency made us free of the limitations of the twelve-tone system.

The composer, having a more or less general idea of the total structure of his project and the distribution of fields of

sound therein, "improvises" on his machinery, experimenting with sounds, selecting what seems useful in terms of the image he has in mind, rejecting or putting in storage what does not fit his concept. Thus the work emerges gradually from more or less fully realized passages by filling in what seems to be required for contrast or transition, adding here, cutting out there, adjusting prerecorded elements, in other words, doing things that are reminiscent of rather oldfashioned ways of composing music, except that they do not take place on paper. This activity is perhaps more related to creating an abstract painting. But whatever importance is attached to its improvisional component, its result is definitive. What is recorded on the tape, is The Work, with no allowance for indeterminacy or chance -- unless the tape is further electronically manipulated in performance, which would simply mean that the product as furnished by the laboratory was only partly finished and designed for applying various additional improvisational finishing touches. The notion that the product delivered by Beethoven is not finished either because it is exposed to innumerable interpretations does not hold good, for these interpretations do not attck its substance -- at least we hope so.

Some composers, especially beginners venturing into the field of electronics, become so infatuated with the exciting unheard-of sounds they are able to produce that they overlook that the most sensational acoustical phenomena are only material which fails to hold the listener's interest unless it is used in a more demanding context. If the experience of serialism has eliminated ability or inclination for traditional structural design, it simply means that composing interesting music has become so much more difficult because something else has to take over the role of contextual variety and continuity that seems to be indispensable if the listener is to be kept awake.

Personally I found that certain combinations of electronic elements with live instrumental and vocal materials to be a particularly attractive way of using the medium. The impersonal quality of the electronic sound and its startling potentialities of formid-

able amplification add to the humane character of instrumental and vocal sounds unexpected monumental grandeur and gripping dramatic contrast. In such combinations electronic sound is also better suited to public performance than in its pure form which seems to favor private reception over the radio or from a tape recorder.

It is probably partly due to the observation that much of post-serial music must offer stimuli over and above what it can do by acoustical means to keep the recipient's attention in focus, but partly also to the fact that group improvisation frequently approaches the character of a parlor game, that eventually the visual aspects of music-making are stressed so that it becomes a "happening", a multifaceted slice of life. Undoubtedly this tendency reveals pronounced hostility toward a frame of mind in which art is considered a realm separated from ordinary life and revered for its being exempted from the vicissitudes to which undistinguished mortals are exposed. It has been little noticed that this attitude is not far removed from the reactionary pre-Nazi mentality of promoting Spielmusik, togetherness, and craft instead of art. But while then value was attached to skills that had to be learned the encouragement of do-it-yourselfers to do their own thing tends to equaling the creation of music to unskilled labor. Whether audiences are invited to walk around during performances and to pay only casual attention to the music played (which has been practiced in "promenade"concerts and public parks since time immemorial), or to participate in it by making noises on homemade tools (which is "progress"); whether traditional instruments are abused in outrageous ways and possibly destroyed for good measure (which once was known as students' pranks); whether obscenities are sung or shouted and customers in the audience molested from the stage -- the intention always is to divest the art of that solemn dignity behind which it was hiding and which is considered hypocritical and standing in the way of progress toward more humane social conditions.

It is entirely possible to sympathize with the sedtructive tendency revealed in these exercises and to dream of starting over again with a clean slate. However, so far the anti-art manifestations claim to be evaluated on the terms of legitimate art, and here they

Here I should like to mention a piece for chamber orchestra and electronic sounds, called Exercises of a late hour. Its orchestral part offers a brief survey of dodecaphonic procedure progressing from the most elementary run-through of the twelve-tone row in unison and equal meter to more involved canonic structures, in confrontation with the improvisation-like spontaneity of the interweaving electronic elements.

Another work in which I exploited the polarity of live and electronic sound is Quintina f. voice and six players. Here I applied the rotational principle of the Sestina however reduced (from six elements) to five. While the poem that I wrote for the earlier work deals with the dialectic interrelation of total predetermination and unpredictable chance,

contemplated
I ~~used~~ in the Quintina the alienation of language and music. Again the instrumental passages are premeditated ~~in analogy~~ according to the procedure discussed for Horizon circled with the difference that here the time segments have only one to five units; the intervening and overlapping electronic sections show the free articulation germane to this medium.

are mostly found wanting. The revolting nuisance is meant to produce a shock by taking place where the exalted had been held in awe, but by comparison it usually appears inane. The piano into which a can of peas is pored is the same on which we only yesterday heard Beethoven, and on the wall where we used to see Rembrandt hangs a toilet seat. The shock wears off quickly. But when the anti-art reliquishes its aggressive ambitions and blends into the shapeless manifold of everyday's life it soon takes on the character of decorative art, like wallpaper, or the music the music we hear in elevators and supermarkets; or it becomes shallow entertainment. While we may visualize with equanimity a world without public consumption of "serious" music, we doubt that the multimedia exertions will offer a satisfactory substitute.