elements, and these, again, have their basis in certain of the most elementary, intimate, and vital experiences through which we live as human beings. Let us consider now the means through which these raw materials are coordinated, become coherent, and are rendered significant; through which, in other words, they begin to be music.

Edgard Varèse

[1885 - 1965]

For years known only to a handful of musical cognoscenti, the work of Varèse has recently become more widely appreciated, and its influence upon composers of the twentieth century is just beginning to be evaluated. Classically trained in his native France, Varèse came to America in 1915 and began to work in the cause of new music, organizing and presenting concerts in collaboration with such figures as Leopold Stokowski and his fellow composer Carlos Salzedo. After a period of almost twenty years of not composing, Varèse turned again to the creation of music, pioneering the use of electronic media. Recognition came rapidly during the last years of his life, and young composers the world over regard him as one of the major figures in new music.

Varèse was responsible for many innovations; among these were his use of electronic instruments and tape, as well as his concern with scientific developments and their reflection in musical forces.

Perhaps even more significant, however, was his approach to music not in terms of the doctrine of the affections but as sonoric and rhythmic balance—the brightness of sonority for its own sake. Varèse articulates this approach in great detail in the essays published here.

Excerpts from lectures by Edgard Varèse, compiled and edited with footnotes by Chou Wen-Chung.

The Liberation of Sound

I dream of instruments obedient to my thought and which with their contribution of a whole new world of unsuspected sounds, will lend themselves to the exigencies of my inner rhythm.[1]

New Instruments and New Music

(From a lecture given at Mary Austin House, Santa Fe, 1936)

At a time when the very newness of the mechanism of life is forcing our activities and our forms of human association to break with the traditions and the methods of the past in the effort to adapt themselves to circumstances, the urgent choices which we have to make are concerned not with the past but with the future. We cannot, even if we would, live much longer by tradition. The world is changing, and we change with it. The more we allow our minds the romantic luxury of treasuring the past in memory, the less able we become to face the future and to determine the new values which can be created in it.

Art's function is not to prove a formula or an esthetic dogma. Our academic rules were taken out of the living works of former masters. As Debussy has said, *works of art make rules but rules do not make works of art.* Art exists only as a medium of expression.

The emotional impulse that moves a composer to write his scores contains the same element of poetry that incites the scientist to his discoveries. There is solidarity between scientific development and the progress of music. Throwing new light on nature, science permits music to progress—or rather to grow and change with changing times—by revealing to our senses harmonies and sensations before unfelt. On the threshold of beauty science and art collaborate. John Redfield voices the opinion of

[1] From "391" (periodical), No. 5 (June 1917); transl. from the French by Louise Varèse.

many when he says: "There should be at least one laboratory in the world where the fundamental facts of music could be investigated under conditions reasonably conducive to success. The interest in music is so widespread and intense, its appeal so intimate and poignant, and its significance for mankind so potent and profound, that it becomes unwise not to devote some portion of the enormous outlay for music to research in its fundamental questions."[2]

When new instruments will allow me to write music as I conceive it, the movement of sound-masses, of shifting planes, will be clearly perceived in my work, taking the place of the linear counterpoint. When these sound-masses collide, the phenomena of penetration or repulsion will seem to occur. Certain transmutations taking place on certain planes will seem to be projected onto other planes, moving at different speeds and at different angles. There will no longer be the old conception of melody or interplay of melodies. The entire work will be a melodic totality. The entire work will flow as a river flows.

We have actually three dimensions in music: horizontal, vertical, and dynamic swelling or decreasing. I shall add a fourth, sound projection—that feeling that sound is leaving us with no hope of being reflected back, a feeling akin to that aroused by beams of light sent forth by a powerful searchlight—for the ear as for the eye, that sense of projection, of a journey into space.

Today with the technical means that exist and are easily adaptable, the differentiation of the various masses and different planes as well as these beams of sound, could be made discernible to the listener by means of certain acoustical arrangements. Moreover, such an acoustical arrangement would permit the delimitation of what I call "zones of intensities." These zones would be differentiated by various timbres or colors and different loudnesses. Through such a physical process these zones would appear of different colors and of different magnitude, in different perspectives for our perception. The role of color or timbre would be completely changed from being incidental, anecdotal, sensual or picturesque; it would become an agent of delineation, like the different colors on a map separating different areas, and an integral part of form. These zones would be felt as isolated, and the hitherto unobtainable non-blending (or at least the sensation of non-blending) would become possible.

In the moving masses you would be conscious of their transmutations when they pass over different layers, when they penetrate certain opacities, or are dilated in certain rarefactions. Moreover, the new musical apparatus

[2] John Redfield, *Music, a Science and an Art* (New York, 1928).

I envisage, able to emit sounds of any number of frequencies, will extend the limits of the lowest and highest registers, hence new organizations of the vertical resultants: chords, their arrangements, their spacings—that is, their oxygenation. Not only will the harmonic possibilities of the overtones be revealed in all their splendor, but the use of certain interferences created by the partials will represent an appreciable contribution. The never-before-thought-of use of the inferior resultants and of the differential and additional sounds may also be expected. An entirely new magic of sound!

I am sure that the time will come when the composer, after he has graphically realized his score, will see this score automatically put on a machine that will faithfully transmit the musical content to the listener. As frequencies and new rhythms will have to be indicated on the score, our actual notation will be inadequate. The new notation will probably be seismographic. And here it is curious to note that at the beginning of two eras, the Mediaeval primitive and our own primitive era (for we are at a new primitive stage in music today), we are faced with an identical problem: the problem of finding graphic symbols for the transposition of the composer's thought into sound. At a distance of more than a thousand years we have this analogy: our still primitive electrical instruments find it necessary to abandon staff notation and to use a kind of seismographic writing much like the early ideographic writing originally used for the voice before the development of staff notation. Formerly the curves of the musical line indicated the melodic fluctuations of the voice; today the machine-instrument requires precise design indications.

Music as an Art-Science

(From a lecture given at the University of Southern California, 1939)

The philosophers of the Middle Ages separated the liberal arts into two branches: the *trivium*, or the Arts of Reason as applied to language—grammar, rhetoric and dialectic—and the *quadrivium*, or the Arts of Pure Reason, which today we would call the Sciences, and among which music has its place in the company of mathematics, geometry and astronomy.

Today, music is more apt to be rated with the arts of the *trivium*. At least, it seems to me that too much emphasis is placed on what might be called the grammar of music.

At different times and in different places music has been considered either as an Art or as a Science. In reality music partakes of both. Hoëne

Wronsky and Camille Durutte,[3] in their treatise on harmony in the middle of the last century, were obliged to coin new words when they assigned music its place as an "Art-Science," and defined it as "the corporealization of the intelligence that is in sounds." Most people rather think of music solely as an art. But when you listen to music do you ever stop to realize that you are being subjected to a physical phenomenon? Not until the air between the listener's ear and the instrument has been disturbed does music occur. Do you realize that every time a printed score is brought to life it has to be re-created through the different sound machines, called musical instruments, that make up our orchestras, are subject to the same laws of physics as any other machine? In order to anticipate the result, a composer must understand the mechanics of the instruments and must know just as much as possible about acoustics. Music must live in sound. On the other hand, the possession of a perfectly pitched ear is only of a relative importance to a composer. What a composer must have, must have been born with, is what I call the "inner ear," the ear of imagination. The inner ear is the composer's Pole Star! Let us look at music as it is more popularly considered—as an Art—and inquire: what is composition?

Brahms has said that composition is the *organizing of disparate elements*. But what is the situation of the would-be creator today, shaken by the powerful impulses and rhythms of this age? How is he to accomplish this "organizing" in order to express himself and his epoch? Where is he to find those "disparate elements"? Are they to be found in the books he studies in his various courses in harmony, composition, and orchestration? Are they in the great works of the great masters that he pores over with love and admiration and, with all his might, means to emulate? Unfortunately too many composers have been led to believe that these elements can be found as easily as that.[4]

Eric Temple Bell, in a book called *The Search for Truth*, says: "Reverence for the past no doubt is a virtue that has had its uses, but if we are to go forward the reverent approach to old difficulties is the wrong one!" I should say that in music the "reverent approach" has done a great deal of harm: it has kept would-be appreciators from really appreciating! And it has created the music critic! The very basis of creative work is irreverence! The very basis of creative work is experimentation—bold experimentation.

[3] Hoëne Wronsky (1778-1853), also known as Joseph Marie Wronsky, was a Polish philosopher and mathematician, known for his system of *Messianism*. Camille Durutte (1803-1881), in his *Technie Harmonique* (1876), a treatise on "musical mathematics," quoted extensively from the writings of Wronsky.

[4] This, Varèse said in the same lecture, "undoubtedly accounts for one of the most deplorable trends of music today—the impotent return to the formulas of the past that has been called neo-Classicism."

You have only to turn to the revered past for the corroboration of my contention. The links in the chain of tradition are formed by men who have all been revolutionists! To the student of music I should say that the great examples of the past should serve as springboards from which he may leap free, into his own future.

In every domain of art, a work that corresponds to the need of its day carries a message of social and cultural value. Preceding ages show us that changes in art occur because societies and artists have new needs. New aspirations emanate from every epoch. The artist, being always of his own time, is influenced by it and, in turn, is an influence. It is the artist who crystallizes his age—who fixes his age in history. Contrary to general notion, the artist is never ahead of his own time, but is simply the only one who is not way behind.

Now let me come back to the subject of music as an Art-Science. The raw material of music is sound. That is what the "reverent approach" has made most people forget—even composers. Today, when science is equipped to help the composer realize what was never before possible—all that Beethoven dreamed, all that Berlioz gropingly imagined possible—the composer continues to be obsessed by the traditions that are nothing but the limitations of his predecessors. Composers, like everyone else today, are delighted to use the many gadgets continually put on the market for our daily comfort. But when they hear sounds that no violins, no woodwind or percussion instruments of the orchestra can produce, it does not occur to them to demand those sounds of science. Yet science is even now equipped to give them everything they may require.

Personally, for my conceptions, I need an entirely new medium of expression: a sound-*producing* machine (not a sound-*reproducing* one). Today it is possible to build such a machine with only a certain amount of added research.

If you are curious to know what such a machine could do that the orchestra with its man-powered instruments cannot do, I shall try briefly to tell you: whatever I write, whatever my message, it will reach the listener unadulterated by "interpretation." It will work something like this: after a composer has set down his score on paper by means of a new graphic notation, he will then, with the collaboration of a sound engineer, transfer the score directly to this electric machine. After that, anyone will be able to press a button to release the music exactly as the composer wrote it—exactly like opening a book.

And here are the advantages I anticipate from such a machine: liberation from the arbitrary, paralyzing tempered system; the possibility of obtaining any number of cycles or, if still desired, subdivisions of the

octave, and consequently the formation of any desired scale; unsuspected range in low and high registers; new harmonic splendors obtainable from the use of sub-harmonic combinations now impossible; the possibility of obtaining any differentiation of timbre, of sound-combinations; new dynamics far beyond the present human-powered orchestra; a sense of sound-projection in space by means of the emission of sound in any part or in many parts of the hall, as may be required by the score; cross-rhythms unrelated to each other, treated simultaneously, or, to use the old word, "contrapuntally," since the machine would be able to beat any number of desired notes, any subdivision of them, omission or fraction of them—all these in a given unit of measure or time that is humanly impossible to attain.

In conclusion, let me read to you something that Romain Rolland said in his *Jean Christophe* and which remains pertinent today. Jean Christophe, the hero of his novel, was a prototype of the modern composer and was modeled on different composers whom Romain Rolland knew—among others, myself.

> The difficulty began when he tried to cast his ideas in the ordinary musical forms: he made the discovery that none of the ancient molds were suited to them; if he wished to fix his visions with fidelity he had to begin by forgetting all the music he had heard, all that he had written, to make a clean slate of all the formalism he had learned, of traditional technique, to throw away those crutches of impotency, that bed, all prepared for the laziness of those who, fleeing the fatigue of thinking for themselves, lie down in other men's thoughts.[5]

Rhythm, Form and Content

(from a lecture given at Princeton University, 1959)

My fight for the liberation of sound and for my right to make music with any sound and all sounds has sometimes been construed as a desire to disparage and even to discard the great music of the past. But that is where my roots are. No matter how original, how different a composer may seem, he has only grafted a little bit of himself on the old plant. But this he should be allowed to do without being accused of wanting to kill the plant. He only wants to produce a new flower. It does not matter if at first it seems to some people more like a cactus than a rose. Many of the old masters are my intimate friends—all are respected colleagues. None of them are dead saints—in fact, none of them are dead—and the rules they made for them-

[5] Romain Rolland (1866–1944), *Jean Christophe* (1904–12); published in English as *John Christopher* (G. Cannan, tr.; 1910–13).

selves are not sacrosanct and are not everlasting laws. Listening to music by Perotin, Machaut, Monteverdi, Bach, or Beethoven, we are conscious of living substances; they are "alive in the present." But music written in the manner of another century is the result of culture and, desireable and comfortable as culture may be, an artist should not lie down in it. The best bit of criticism André Gide ever wrote was this confession, which must have been wrung from him by self-torture: "When I read Rimbaud or the Sixth Song of Maldoror, I am ashamed of my own works and everything that is only the result of culture."

Because for so many years I crusaded for new instruments[6] with what may have seemed fanatical zeal, I have been accused of desiring nothing less than the destruction of all musical instruments and even of all performers. This is, to say the least, an exaggeration. Our new liberating medium—the electronic—is not meant to replace the old musical instruments, which composers, including myself, will continue to use. Electronics is an additive, not a destructive, factor in the art and science of music. It is because new instruments have been constantly added to the old ones that Western music has such a rich and varied patrimony.

Grateful as we must be for the new medium, we should not expect miracles from machines. The machine can give out only what we put into it. The musical principles remain the same whether a composer writes for orchestra or tape. Rhythm and form are still his most important problems and the two elements in music most generally misunderstood.

Rhythm is too often confused with metrics. Cadence or the regular succession of beats and accents has little to do with the rhythm of a composition. Rhythm is the element in music that gives life to the work and holds it together. It is the element of stability, the generator of form. In my own works, for instance, rhythm derives from the simultaneous interplay of unrelated elements that intervene at calculated, but not regular, time-lapses. This corresponds more nearly to the definition of rhythm in physics and philosophy as "a succession of alternate and opposite or correlative states."

As for form, Busoni once wrote: "Is it not singular to demand of a composer originality in all things and to forbid it as regards form? No

[6] As early as 1916, Varèse was quoted in the New York *Morning Telegraph* as saying: Our musical alphabet must be enriched. We also need new instruments very badly. . . . In my own works I have always felt the need of new mediums of expression . . . which can lend themselves to every expression of thought and can keep up with thought." And in the *Christian Science Monitor*, in 1922: "The composer and the electrician will have to labor together to get it."

wonder that once he becomes original, he is accused of formlessness."[7]

The misunderstanding has come from thinking of form as a point of departure, a pattern to be followed, a mold to be filled. Form is a result—the result of a process. Each of my works discovers its own form. I could never have fitted them into any of the historical containers. If you want to fill a rigid box of a definite shape, you must have something to put into it that is the same shape and size or that is elastic or soft enough to be made to fit in. But if you try to force into it something of a different shape and harder substance, even if its volume and size are the same, it will break the box. My music cannot be made to fit into any of the traditional music boxes.

Conceiving musical form as a *resultant*—the result of a process—I was struck by what seemed to me an analogy between the formation of my compositions and the phenomenon of crystallization. Let me quote the crystallographic description given me by Nathaniel Arbiter, professor of minerology at Columbia University:

> The crystal is characterized by both a definite external form and a definite internal structure. The internal structure is based on the unit of crystal which is the smallest grouping of the atoms that has the order and composition of the substance. The extension of the unit into space forms the whole crystal. But in spite of the relatively limited variety of internal structures, the external forms of crystals are limitless.

Then Mr. Arbiter added in his own words:

> Crystal form itself is a *resultant* [the very word I have always used in reference to musical form] rather than a primary attribute. Crystal form is the consequence of the interaction of attractive and repulsive forces and the ordered packing of the atom.

This, I believe, suggests, better than any explanation I could give, the way my works are formed. There is an idea, the basis of an internal structure, expanded and split into different shapes or groups of sound constantly changing in shape, direction, and speed, attracted and repulsed by various forces. The form of the work is the consequence of this interaction. Possible musical forms are as limitless as the exterior forms of crystals.

Connected with this contentious subject of form in music is the really futile question of the difference between form and content. There is no difference. Form and content are one. Take away form, and there is no content,

[7] Ferruccio Busoni, *Sketch of a New Esthetic of Music*, transl. by Dr. Theodore Baker (New York, 1911); reprinted in *Three Classics in the Aesthetic of Music* (New York, Dover Publications 1962), p. 79. Also reprinted in this book, see p. 3.

and if there is no content, there is only a rearrangement of musical patterns, but no form. Some people go so far as to suppose that the content of what is called program music is the subject described. This subject is only the ostensible motive I have spoken of, which in program music the composer chooses to reveal. The content is still only music. The same senseless bickering goes on over style and content in poetry. We could very well transfer to the question of music what Samuel Beckett has said of Proust: "For Proust the quality of language is more important than any system of ethics or esthetics. Indeed he makes no attempt to dissociate form from content. The one is the concretion of the other—the revelation of a world."[8] To reveal a new world is the function of creation in all the arts, but the act of creation defies analysis. A composer knows about as little as anyone else about where the substance of his work comes from.

As an epigraph to his book,[9] Busoni uses this verse from a poem by the Danish poet, Oelenschläger:

> What seek you? Say! And what do you expect?
> I know not what; the Unknown I would have!
> What's known to me is endless; I would go
> Beyond the known: The last word still is wanting.
>
> (*Der mächtige Zauberer*)

And so it is for any artist.

Spatial Music

(From a lecture given at Sarah Lawrence College, 1959)

When I was about twenty, my own attitude toward music—at least toward what I wanted my music to be—became suddenly crystallized by Hoëne Wronsky's definition of music.[10] It was probably what first started me thinking of music as spatial—as bodies of intelligent sounds moving freely in space, a concept I gradually developed and made my own. Very early, musical ideas came to me that I realized would be difficult or impossible to express with the means available, and my thinking even then began turning around the idea of liberating music from the tempered system, from the limitations of musical instruments, and from years of bad

[8] Samuel Beckett, *Proust* (1957).
[9] Busoni, *op. cit.*, p. 75.
[10] See note 3 above.

habits, erroneously called tradition. I studied Helmholtz, and was fascinated by his experiments with sirens described in his *Physiology of Sound*.[11] I went to the *Marché aux Puces*, where you can find just about anything, in search of a siren, and picked up two small ones. With these, and using also children's whistles, I made my first experiments in what later I called *spatial music*.

In those formative years I had the good fortune to become a friend of Busoni. As everybody knows, or should know, Ferruccio Busoni was not only a great pianist, a great musician, but also a great and clairvoyant intelligence. I met Busoni when I was living in Berlin before the First World War. I was already familiar with his remarkable book, *Sketch of a New Esthetic of Music*, which was another milestone in my musical development. Imagine my excitement on reading these words of his: "Music was born free; and to win freedom is its destiny." Until then I had supposed no one but myself held such a theory. When I took Busoni my scores, he was at once interested and in spite of the great difference of age a friendship developed during the remaining years I was in Berlin. We talked at length on all the questions that were my chief preoccupation at the time—and still are. Although our views differed radically on many subjects connected with the art of music, I am convinced that it was those long talks with Busoni, during which new horizons were constantly opening for me, that helped crystallize my ideas and confirmed my belief that new means must be found to liberate sound, to free it from the limitations of the tempered system, make it possible to realize my conception of rhythm as an element of stability, and to achieve unrelated metrical simultaneity.

My first physical attempt to give music greater freedom was by the use of sirens in several of my scores (*Amériques*,[12] *Ionisation*[13]), and I think it was these parabolic and hyperbolic trajectories of sound that made certain writers as far back as 1925 grasp my conception of music as moving in space. For example, Zanotti Bianco, writing in *The Arts*, at that time spoke of "sound masses molded as though in space" and of "great masses in astral space."[14] Of course, it was still only a *trompe l'oreille*, an aural illusion, so to speak, and not yet literally true.

As early as 1927, I learned something of the possibilities of electronics

[11] Hermann L. F. Helmholtz (1821-1894), *Lehre von den Tonempfindungen als physiologische Grundlage für die Theorie der Musik* (1862); published in English as *On the Sensation of Tone as A Physiological Basis for the Theory of Music* (J. Ellis, tr.; 1873).
[12] Composed 1918-21; premiered April 9, 1926.
[13] Composed 1930-31; premiered March 6, 1933.
[14] Massimo Zanotti Bianco, "Edgard Varèse and the Geometry of Sound," in *The Arts*, 1924; "La Geometria sonora di Edgard Varèse," in *Il Pianoforte*, May 1925.

as a musical medium from Rene Bertrand,[15] inventor of the *Dynaphone* (this instrument was one of the precursors of the Martenot,[16] now widely used in Europe); and in 1934 Theremin,[17] a pioneer in this field, built two instruments to my specifications for my composition, *Ecuatorial*,[18] with a range up to 12544.2 cycles.[19] But it was not until 1954 that I had the opportunity of working in a studio with electronic equipment for composing on tape. In the fall of that year the Radiodiffusion Française[20] invited me to finish my tapes of *organized sound* for *Déserts*[21] in their studio in Paris. I had begun them on my one tape recorder in New York. This work is for both mediums, instrumental and tape. It contrasts the sounds of man-powered instruments with electronically treated sounds, alternating but never combining. In passing, I might say that the intervals in the instrumental sections, though they determine the constantly changing and contrasted volumes and planes, are not based on any fixed set of intervals such as a scale or a series. They are determined by the particular requirements of the work.

Now I come to the work you are going to hear tonight: *Poème Électronique*.[22] It is the musical part of a spectacle of sound and light, presented during the Brussels Exposition in the pavilion designed for the Philips Corporation of Holland by Le Corbusier, who was also the author of the visual

[15] Actually, Varèse first met Bertrand in the late spring of 1913. Varèse was naturally aware of Thaddeus Cahill's experiment mentioned in Busoni's book, but was disappointed when he saw it demonstrated in New York after his arrival in this country. In 1927, Varèse began seriously discussing with Harvey Fletcher, then Acoustical Research Director of the Bell Telephone Laboratories, the possibilities of developing an electronic instrument for composing. Subsequently, Varèse also tried to work at the sound studios in Hollywood. Tragically, these repeated attempts were all frustrated by the lack of understanding and financial support. Nevertheless, in the mid-thirties, he did make some very modest experiments with phonograph turntables by using motors of different speeds that could be operated simultaneously, as well as by running the records backward. In spite of the general apathy during those years, Varèse took another step forward and worked on and off on what may be called a "montage in space," entitled *Espace*, to be simultaneously broadcast from various points of the world.

[16] *Ondes Musicales* (generally referred to as *Ondes Martenot*), invented by Maurice Martenot (b. 1898).

[17] Leon Theremin (b. 1896) introduced his first electronic instrument in 1920. The instruments used in *Ecuatorial* are of a later type, belonging to the so-called "finger-board" models.

[18] Composed 1933-34; premiered April 15, 1934. In the published revised version, two Ondes Martenots are specified instead of the Theremins.

[19] An octave and a fifth above the highest C of the piano.

[20] The invitation was extended by Pierre Schaeffer, director of the Studio d'Essai of the French Radio.

[21] Composed 1949-54; premiered Dec. 2, 1954.

[22] Composed 1957-58, completed at Philips Laboratories, Eindhoven, Holland; premiered Brussels Exposition, May-October, 1958.

part.[23] It consisted of moving colored lights, images projected on the walls of the pavilion, and music. The music was distributed by 425 loudspeakers; there were twenty amplifier combinations. It was recorded on a three-track magnetic tape that could be varied in intensity and quality. The loudspeakers were mounted in groups and in what is called "sound routes" to achieve various effects such as that of the music running around the pavilion, as well as coming from different directions, reverberations, etc.

For the first time I heard my music literally projected into space.

The Electronic Medium

(From a lecture given at Yale University, 1962)

First of all, I should like you to consider what I believe is the best definition of music, because it is all-inclusive: "the corporealization of the intelligence that is in sound," as proposed by Hoëne Wronsky.[24] If you think about it you will realize that, unlike most dictionary definitions, which make use of such subjective terms as beauty, feelings, etc., it covers all music, Eastern or Western, past or present, including the music of our new electronic medium. Although this new music is being gradually accepted, there are still people who, while admitting that it is "interesting", say: "but is it music?" It is a question I am only too familiar with. Until quite recently I used to hear it so often in regard to my own works that, as far back as the twenties, I decided to call my music "organized sound" and myself, not a musician, but "a worker in rhythms, frequencies, and intensities." Indeed, to stubbornly conditioned ears, anything new in music has always been called noise. But after all, what is music but organized noises? And a composer, like all artists, is an organizer of disparate elements. Subjectively, *noise* is any sound one doesn't like.

Our new medium has brought to composers almost endless possibilities of expression, and opened up for them the whole mysterious world of sound. For instance, I have always felt the need of a kind of continuous flowing curve that instruments could not give me. That is why I used sirens in several of my works. Today such effects are easily obtainable by electronic means. In this connection, it is curious to note that it is this lack of flow that seems to disturb Eastern musicians in our Western music. To their

[23] The whole spectacle of light and sound, conceived by Le Corbusier, is called "Poème Électronique." Le Corbusier (Charles-Edouard Jeanneret-Gris) died on August 27, 1965, the day before the editing of this article was completed.

[24] See note 3.

ears, it does not glide, sounds jerky, composed of edges of intervals and holes and, as an Indian pupil of mine expressed it, "jumping like a bird from branch to branch." To them, apparently, our Western music seems to sound much as it sounds to us when a record is played backward. But playing a Hindu record of a melodic vocalization backward, I found that it had the same smooth flow as when played normally, scarcely altered at all.

The electronic medium is also adding an unbelievable variety of new timbres to our musical store, but most important of all, it has freed music from the tempered system, which has prevented music from keeping pace with the other arts and with science. Composers are now able, as never before, to satisfy the dictates of that inner ear of the imagination. They are also lucky so far in not being hampered by esthetic codification—at least not yet! But I am afraid it will not be long before some musical mortician begins embalming electronic music in rules.

We should also remember that no machine is a wizard, as we are beginning to think, and we must not expect our electronic devices to compose for us. Good music and bad music will be composed by electronic means, just as good and bad music have been composed for instruments. The computing machine is a marvelous invention and seems almost superhuman. But in reality it is as limited as the mind of the individual who feeds it material. Like the computer, the machines we use for making music can only give back what we put into them. But, considering the fact that our electronic devices were never meant for making music, but for the sole purpose of measuring and analyzing sound, it is remarkable that what has already been achieved is musically valid. These devices are still somewhat unwieldy and time-consuming, and not entirely satisfactory as an art-medium. But this new art is still in its infancy, and I hope and firmly believe, now that composers and physicists are at last working together and music is again linked with science as it was in the Middle Ages, that new and more musically efficient devices will be invented.

Harry Partch

[1901 -]

One of the most challenging yet generally overlooked figures in American music, Partch has devoted his career to the exploration of his unorthodox musical views. This has involved extensive experimentation in acoustics, construction of his own instruments, composition, and teaching. His conception of the acoustic basis of the scale, dividing the octave into 43 tones, was explained in great detail in his book Genesis of a Music, *from which the following chapter has been taken.*

As an experimentalist working in isolation, Partch has had to wait for time to catch up with his ideas. We cannot yet judge which of these ideas the course of new music will accept and which will be discarded. It is enough to note, now, that Partch remains a challenging figure on the American musical scene. In the best tradition of the experimenter he is dedicated, creative, and controversial.

Genesis of a Music (Madison, Wisconsin, University of Wisconsin Press, 1949), Chapter 13.