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EDGARD VARESE AND THE ELECTRONIC MEDIUM

by

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B.A., South Dakota State University, 1976

Presented in partial fulfillment of the requirements

for the degree of

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Edgard Varése and the Electronic Medium (56 pp.)

Director: Joseph Mussulman 

This paper assesses Varése's contributions in the field of contemporary music, and in particular, electronic music. His interest in the development of electronic instruments created a sensibility in other composers that needed to exercise itself in the electronic medium.

Varése's approach to sound was based upon thorough scientific training. In addition, friendships with many Parisian artists at the turn of the century influenced his musical thought. The major influence, however, was Varése's friendship with Feruccio Busoni.

In his early works, Varése developed his concept of organized sound. Varése thought in terms of "planes" and "masses" of sound rather than "notes". He was also extremely conscious of timbral and dynamic subtleties. His most original development, however, was in establishing a sense of movement of sound, which imparted a strong sculptural quality to his creations.

The commercial production of magnetic tape recorders finally allowed the composer to achieve the sounds he had been searching for. His first electronic work, Déserts, contrasts traditional instruments with sounds from the modern industrial world. This paper presents an analysis of Varése's mature concepts, demonstrating many procedures which have entered the mainstream of contemporary musical thought.

EDGARD VARÈSE AND THE ELECTRONIC MEDIUM

Since the mushrooming of electronic technology in the last two decades, American culture has been inundated with electronic sounds. From computerized television games, Hollywood science-fiction movies, and even the push-button telephone, we have become accustomed to the presence of these new sounds. Musicians, realizing the potential of this technology, have brought them into the concert hall, enabling the listener to explore a unique new universe of sound.

Some of the first attempts at electrical sound production began in the early years of this century. In 1906, Thaddeus Cahill introduced his Telharmonium, a keyboard instrument which produced sound by means of alternating current generators, weighed nearly two hundred tons, and transmitted its music over telephone lines. Cahill's work led to other instruments developed for live performance, most notably the Theremin, the Ondes Martenot, and the Trautonium. Composers such as John Cage, and Paul Hindemith were also experimenting with phonographs and motion-picture sound tracks during the years following 1930. After the development of magnetic tape recorders shortly after World War II, activity in the

electronic medium dramatically increased. European radio stations sponsored most of the studios, centered in Paris and Cologne. Pierre Schaeffer and Pierre Henry, working in Paris, preferred using natural environmental sounds for their tape collages, naming their work musique concrète. On the other hand, German composers, led by Herbert Eimert and Karlheinz Stockhausen, utilized electronic sound generators for their works. Parallel developments were occurring in the United States in the work of Vladimir Ussachevsky and Otto Luening. These composers worked with traditional instrumental sound sources, but modified them by tape and electronic manipulations.

The Sixties saw the rapid growth of electronic music studios throughout the world. Advances in technology, especially the invention of transistors, appreciably reduced the size of electronic instruments. In addition, popular musicians became interested in the unique timbres available with the synthesizer, bringing these new sounds out of the academic surroundings of the university studios, and into the everyday lives of countless individuals.

The dream of electronic instruments which Edgard Varèse nurtured for nearly fifty years has come to pass. Varèse is already being regarded as a pioneer in the field by many composers, critics, and listeners, even though the movement is barely thirty years old. Since 1916, he

struggled to obtain, as he put it, "new technical mediums," from engineers and inventors, which would "lend themselves to every expression of thought."¹ Today, instead of standing alone on the threshold of a new era in music, as Varèse was forced to do, composers have turned to electronic instruments, finding new means of expression which are not available with traditional instruments.

The computer also is beginning to play a larger role in music, as in every other facet of modern life. Its use in musicological and acoustical research has been invaluable, but composers are also utilizing the computer as a musical instrument. Through special digital-to-analog converters, the computer can turn a programmer's jumble of numbers into musical sounds. These recent developments resemble a system envisioned by Varèse in 1930. He was quoted then:

I believe that the composer, with the marvelous actual inventions, will be able to write his score in a conventional notation, outside the tempered system. . . in which sounds produce themselves to any frequency or intensity. And when such a score has been written, putting it on a transmitting device and pushing a button, the music will be produced and not interpreted.²

The electronic revolution has not been restricted to instruments, however. Tape recording manufacturers and

¹Fernand Ouellette, Edgard Varèse, trans. by Derek Coltman (New York: The Orion Press, 1966), pp. 46-47.

²David R. Bloch, "The Music of Edgard Varèse" (Ph. D. dissertation, University of Washington, 1973), p. 260.

studios are taking advantage of computers by developing digital technology which may someday make magnetic recording obsolete. The prototype recorders now in use demonstrate marked improvement in the ratio between recorded signal and the inherent "noise" present in all electronic circuits. In addition, frequency response is greater with digital technology, allowing the production of recordings which possess better fidelity than present systems.³

The music publishing industry may be seeing widespread modernization also, if a system being perfected in Denmark becomes marketable. Mogens Kjaer has developed a computerized system that produces full scores, individual parts, transpositions, or piano reductions, from information received by performing on a keyboard attachment. Amazingly, the computer reacts not only to pitch information, but the rhythmic element as well. Until recently, the system has been in its developmental stages, but Kjaer is beginning to offer the use of his brainchild to music publishers.⁴

The electronic revolution is finally a reality, but many of these developments arrived too late for Varèse, who died in 1965. For many years, he had attempted to realize his unique dream of sound with conventional instruments. He crusaded for nearly thirty years,

³Stephen Traiman, "Analog and Digital Technologies Vie," Billboard, January 13, 1979, p. 1.

⁴"Music Printing: Dataland's Scan-Note System," Computer Music Journal 3 (March 1979): pp. 60-61.

badgering engineers and inventors, in order to obtain the instruments he needed. Finally in the early 1950's, an anonymous gift of a tape recorder allowed him to create the music which had been formulating in his mind. The details of this composer's career not only trace a part of the evolution of electronic music, but also illuminate certain concepts which have entered the mainstream of contemporary musical thought.

AESTHETIC INFLUENCES

Varèse's unique approach to sound evolved over a long period of time and out of many sources. Not surprisingly, science played a major role. From an early age, Varèse's father, an engineer by trade, forced his son to concentrate on scientific and mathematical studies, even to the exclusion of the interest in music the child was beginning to show. But the son's interests prevailed, and after leaving home at 17, Varèse entered the Schola Cantorum in Paris, and eventually the Paris Conservatory.

While still a student, Varèse began to perceive a connection between music and science. After discovering physicist Hoene Wronsky's definition of music as "the corporealization of the intelligence that is in sounds," he began to see the tempered system as arbitrarily limiting.⁵

⁵Louise Varèse, Varèse: A Looking-Glass Diary, vol. 1. (New York: W. W. Norton & Co., Inc., 1972), p. 42.

The revolutionary currents stirring through the arts in Paris during the first decade of the twentieth century also contributed to Varèse's general musical conceptions. The discoveries made by Einstein during that time were a major factor in the new basis of art that was being formulated. The fact that matter may not be as solid as it appeared, that time was relative, or that moving bodies were continuously changing to any given perspective, posed new problems to be reconciled by not only artists, but critics and patrons as well.⁶

Varèse also knew of the experiments with sound done by Helmholtz in the late nineteenth century, bringing about the use of sirens in some of his works to take advantage of the characteristics of a continuous melodic curve. This acoustical knowledge also found its way into his general concept of music, judging from comments made in a lecture at Princeton University in 1939:

Most people would 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 recreated through different sound machines, called 'musical instruments'? . . . In order to anticipate the result, a composer must understand the mechanics of the instruments and must know as much as possible about acoustics.⁷

⁶Bloch, "The Music of Edgard Varèse," pp. 145-47.

⁷Edgard Varèse, "Freedom for Music," in The American Composer Speaks Out: An Historical Anthology, ed. Gilbert Chase (Baton Rouge: Louisiana State University Press, 1966), p. 188.

While in Paris, Varèse became acquainted with many artists and writers such as Picasso, Modigliani, Delaunay, Apollinaire, Cocteau, and Rolland, and was present at many aesthetic discussions in the local cafes. As a result, he attempted to reflect their concept of "simultaneism" in his music. As his wife, Louise, relates: "While poets were juggling words on a page and painters were producing curious juxtapositions of noses, ears, eyes, and breasts . . . Varèse was beginning to wonder how it might be obtained musically."⁸ Bloch points out other similarities between Varèse's music and the works of the Cubist painter Robert Delaunay, including a preoccupation with the most basic element (sound or color), a desire to let the material create its own form, and achievement of a "non-blending of colors."⁹

Varèse's concern with timbre, or "the legitimacy of any sound as a vehicle for musical expression," was very similar to the revolutionary proposals of the Italian Futurists.¹⁰ These visual and musical artists shocked early twentieth century European audiences by building instruments which utilized the sounds of the modern industrial world for their compositions. Varèse was

⁸Bloch, "The Music of Edgard Varèse," p. 7.

⁹Ibid., pp. 11-14.

¹⁰H. Wiley Hitchcock, Music in the United States: A Historical Introduction (Englewood Cliffs: Prentice-Hall Inc., 1969), pp. 179-80.

familiar with the Futurists' works, and sympathized with their attempt to enrich the composer's palette by expanding the limited timbres available with traditional instruments, but he disavowed any connection with their movement. Writing in the literary magazine 391 in 1917, Varèse complained:

Italian futurists, why do you merely reproduce the vibrations of our daily life only in their superficial and distressing aspects . . . My dream is of instruments that will obey my thoughts, and which by bringing about a flowering of hitherto unsuspected timbres, will lend themselves to the combinations it will please me to oppose on them.¹¹

Varèse became disenchanted with the musical climate of Paris in the early 1900's, and traveled to Berlin in 1907. He had always admired the works of the great German masters, but more importantly, he was drawn to the German capital because of a musician whose outlook on the future closely resembled his own. The resulting friendship with Ferruccio Busoni was a major influence on Varèse's musical thought. Busoni's Sketch of a New Musical Aesthetic, which Varèse had read shortly before his trip, contains uncanny predictions for the future of music, including the use of machines in music, the expansion of the major-minor scale system, and tempered tuning. In addition, Busoni had experimented with 113 different scales utilizing the chromatic octave, and also advocated

¹¹Ouellette, Edgard Varèse, p. 39.

scales based on thirds and sixths of a tone.¹² Salzman has noted that the composing career of Varèse represents "the working out of ideas that Busoni proposed but was incapable of realizing."¹³ Much later in life, Varèse revealed admiration for his German friend and mentor to Gunther Schuller, stating that Busoni's book "predicts precisely what is happening today in music."¹⁴

NEW BEGINNINGS IN AMERICA

Soon after his arrival in America in 1915, a journey undertaken to extricate himself from the confines of European formality and to bolster his conducting career, Varèse began his crusade to liberate sound. Despite the fact that the instruments he felt a need for were not yet in existence, Varèse continually struggled on behalf of modern music.

In order to accustom the public's ear to the new sounds being written, Varèse organized the New Symphony Orchestra in New York during 1919, also serving as its conductor. The programs presented met with ridicule from both audiences and critics. Not even Varèse's strong

¹²Michael Nyman, Experimental Music (New York: Schirmer Books, 1974), p. 34.

¹³Gunther Schuller, "Conversation with Varèse," in Perspectives on American Composers, vol. 1, ed. Benjamin Boretz and Edward Cone (New York: W. W. Norton & Co., Inc., 1971), p. 35.

¹⁴Eric Salzman. "Edgard Varèse," Stereo Review, June 1971, p. 58.

personality could withstand this barrage of insults, and he resigned in a rage in the fall of 1919 after a disagreement with financial supporters.

Varèse spent the next few years composing, but returned to the forefront of musical life in New York when he formed the International Composer's Guild with Carlos Salzedo in 1921. This society, formed solely to present the music of contemporary composers, "shook the musical world into an awareness of new music and created an atmosphere tolerable for serious composers."¹⁵ During its six years of existence, the Guild presented many premieres, including works by Ruggles, Ives, Bartok, Berg, Hindemith, Stravinsky, Webern, Schoenberg, and Varèse's Offrandes, Hyperprism, Octandre, and Intégrales.¹⁶

Through these early chamber works, and including two major works for orchestra, Amériques and Arcana, Varèse developed his concept of organized sound. He believed sound to be the primary substance of music, and attempted to utilize "blocks of sound, calculated and balanced against each other," in his music.¹⁷ Listeners were slow to grasp this concept because Varèse disregarded notes and chords in favor of direct employment of sound.

¹⁵Chou Wen-Chung, "Open Rather Than Bounded," Perspectives of New Music no. 1 (1966): p. 53.

¹⁶Chou Wen-Chung, "Varèse: A Sketch of the Man and His Music," The Musical Quarterly 52 (1966): p. 154.

¹⁷Schuller, "Conversation with Varèse," p. 36.

This idea, though revolutionary for its time, was not without precedent. Chou Wen-Chung, a student of Varèse, has observed in his tutor's works "a modern Western parallel of a pervasive Chinese concept: that each single tone is a musical entity in itself, that musical meaning lies intrinsically in the tones themselves, and that one must investigate tones to know music."¹⁸

From the undifferentiated field of sound available to him, Varèse constructed what he termed "sound masses" and "planes of sound." Planes were considered to be as few as one or two specific pitches, while masses were delineated in various ways, based on combinations of pitch, timbre, rhythm, intensity, and attack/decay properties. Once the sound mass was established, it could gradually undergo changes in tension, timbre, and other qualities. Varèse called this process "transmutation," a term he adopted from the medieval alchemist Paracelsus.¹⁹ A typical example of this technique is found in the opening measures of Hyperprism (see Appendix; Example 1).

As Example 1 shows, Varèse was extremely conscious of timbral subtleties. He was always meticulous in his choice of instrumental combinations, attempting to create various "zones of intensities" in his music. He felt timbre

¹⁸Chou Wen-Chung, "Asian Concepts and Twentieth Century Western Composers," The Musical Quarterly 57 (April 1971): p. 216.

¹⁹Bloch, "The Music of Edgard Varèse," p. 39.

should become "an agent of delineation, like the different colors on a map separating different areas, and an integral part of form."²⁰

Varèse not only discovered many new and exciting timbral shadings in his early works, but also demonstrated a sensitive ear for dynamic nuances as well. Henry Cowell noticed Varèse's care "to supply the ear with subtleties of dynamic change which take the place of melody in certain passages."²¹ Example 2 clearly shows this pre-occupation, in addition to the composer's manipulation of the envelope characteristics of the various instruments. (see Appendix; Example 2).

Besides the existing musical dimensions—horizontal, vertical, and dynamic—Varèse recognized a fourth, "sound projection." Many critics and listeners have discerned a sculptural quality to Varèse's sound creations, a feeling of "shifting perspective, as if you were looking at a sculpture from different angles."²² He was determined to establish, and succeeded to a certain extent in his early works, a sense of movement of sound masses:

²⁰Edgard Varèse, "The Liberation of Sound," in Contemporary Composers on Contemporary Music, ed. Elliott Schwartz and Barney Childs (New York: Holt, Rinehart and Winston, 1967), p. 197.

²¹Henry Cowell, ed., American Composers on American Music (Stanford: Stanford University Press, 1933), p. 45.

²²Ruth Julius, "Edgard Varèse: An Oral History Project," Current Musicology no. 125 (1978): p. 42.

"that feeling that sound is leaving us with no hope of being reflected back."²³

As the description of Varèse's procedures may reveal, sound was allowed to proceed along interacting or repulsing paths, as the composer's will dictated. Reiterated motivic figures hover about a single pitch or group of pitches, while other ideas continually change shape, direction, or speed. Varèse compared the form of his works to the scientific process of crystallization. He was fond of referring to a scientist's description of crystallization in order to explain his concept of form as the "result of a process."²⁴

It is also evident that Varèse utilized the tonal system only because he was locked into it by existing instruments. This was a fact he made known throughout his career, as in 1924, when he wrote:

Just as the painter can obtain different intensity and gradation of colour, musicians can obtain different vibrations of sound, not necessarily conforming to the traditional half-tone and full-tone, but varying ultimately from vibration to vibration.²⁵

The desire to create complex aural images also required a high degree of virtuosity in Varèse's music. The composer was initially frustrated by feeble performances

²³Edgard Varèse, "The Liberation of Sound," p. 197.

²⁴Ibid., pp. 202-203.

²⁵Chou Wen-Chung, "Open Rather Than Bounded," p. 49.

of his work, but was rewarded by its rediscovery in the early 1950's, when the new virtuosity in contemporary music performance could better accommodate its intricacies.

THE SILENT STRUGGLE

The early years of 1930 were filled with an ever-widening search for new instruments which could reflect the sounds of the modern world. The frustration of working with instruments designed for last century's music forced Varèse to experiment with percussion instruments. By 1933, he had become so dissatisfied that he tried to project his concepts through the first major work for percussion ensemble, Ionisation. He had always employed percussion on an independent and equal footing with traditional instruments, but this work devotes itself exclusively to the timbral qualities of metal, membrane, and wooden instruments, in addition to two sirens. The work calls for thirty-five different instruments to be played by thirteen performers, with instructions for many unorthodox methods of striking the instruments included. Shimmering masses of sound are projected about the performing area in an uncanny display of rhythmic variety, making it a masterpiece of its time.

With Ionisation, Varèse drew one step closer to his dream of sound manipulation. He had become aware of Cahill's Telharmonium through Busoni many years earlier,

but was still without the instruments he knew could be developed. As early as 1926, he began communicating with Dr. Harvey Fletcher of the Bell Telephone Laboratories. During the next several years, he was in consultation with the French inventors Rene Bertrand and Maurice Martenot concerning very explicit ideas about the development of an instrument which could "reproduce all existing sounds and collaborate in the creation of new timbres." Varèse also foresaw, years before its realization, "the possibilities of subdivisions in relation to a mass: it can be divided into other masses, other volumes, other levels, all by means of loudspeakers arranged in different places."²⁶

Finally in 1934, Leon Termen, a Russian inventor, had sufficiently developed his instrument to the point that Varèse could utilize electronically produced sound in Ecuatorial. The work combines bass voice with woodwinds, brass, keyboard, percussion, and the two Theremins in a truly imaginative setting of an ancient Mayan prayer. Varèse meant to convey "the elemental simplicity and fierce intensity" of the pre-Columbian cultures in South America.²⁷ Writing with the Russian bass Chaliapin in mind, he creates a solemn ritual, often calling for the singer to hum, speak, or mumble lines of the text.

²⁶Salzman, "Edgard Varèse," p. 61.

²⁷Louise Varèse, "Varèse in New York," High Fidelity/Musical America, February 1977, p. 75.

The treatment of traditional instruments in Ecuatorial follows the same procedures as earlier works. Masses of sound are created by various instrumental groups, and are then transformed or penetrated by other masses. In combining the wholly new timbre of the Theremin, Varèse entered the new age of electronic music.

Initial demonstrations of the Theremin did not impress Varèse because of unsuccessful attempts to imitate existing instruments. After several years of collaboration and experimentation with Termen, a working model was developed which was controlled, with respect to pitch and loudness, by the proximity of the hand to antennae. The still rather crude instruments were capable of attaining pitches as high as 11,000 cycles per second but due to technical difficulties, "marred the ensemble now and then," according to one critic present at the premiere.²⁸ Varèse wrote for the instruments in traditional notation, utilizing many glissandi effects which the Theremin produce with such ease. The electronic howlers were not allowed to dominate the ensemble, and can be heard most clearly only at the end of the work in an unaccompanied duet.

Although Ecuatorial was only Varèse's first attempt with such sound-producers, he was not pleased with the result, nor with the progress of electronic sound research

²⁸Louise Varèse, "Varèse in New York," p. 74-76.

in general. He was aware of the experimentation done with phonographs and avant-garde sound film. In 1933, Varèse applied for a Guggenheim Fellowship to pursue acoustical studies, but was turned down. He also was refused access to Hollywood studio facilities. In the years following Ecuatorial, Varèse often became bitter, refusing to write. It was as if he were cursing music, willing to suffer without it until the time when he could create exactly what he wanted with proper equipment.

Throughout his twelve year period of silence, Varèse's imagination and creative energy remained intact. Except for Density 21.5, written in 1936, no works were completed. A scenario begun in 1928, entitled l'Astronome, contained too many technical difficulties to ever reach the performance stage, even though Varèse worked on the problems for years. It was projected as a multimedia production, including dance and narration, which would tell the story of an astronomer from the year 2000 who receives and answers extraterrestrial signals. Besides this project, Varèse chose some extracts of earlier works and arranged them to accompany a film by his friend Bouchard. He had always been interested in the musical possibilities of the sound film, but further collaboration with Bouchard necessitated a wait for technological progress.

In the meantime, Varèse kept quite busy with other music, if not his own. His energy never waned.

In 1937, he founded a Schola Cantorum in Santa Fe, New Mexico. The Greater New York Chorus began in 1941, with Varèse as conductor and the support of Ruggles, Schoenberg, Bartok, and others. Both organizations were dedicated to the performance of unknown composers of this century, or earlier periods.²⁹

Étude pour Espace, premiered in 1947, brought Varèse's period of silence to an end. The work, though it does not include electronic instruments, is scored for two pianos, percussion, and mixed chorus. Varèse dispensed with a coherent text, perhaps for the first time in history, and substituted instead selected phrases from different languages, none having any relationship to the others.³⁰ He originally conceived the work to be broadcast simultaneously from all world capitals, so that "all men could have listened simultaneously to this song of brotherhood and liberation."³¹

During the 1940's and early 1950's, Varèse became the outspoken champion of contemporary music. His numerous lectures and articles of this period display a deep understanding of art and its role in society, along with a clear vision of the changes needed to enable art to reflect modern society's development. He explained

²⁹Ouellette, Edgard Varèse, p. 159.

³⁰Ibid., p. 163.

³¹Ibid., p. 132.

that music and science must become partners, an advantage the other arts, especially architecture, had already taken. It seemed his fame was spreading even though the bulk of his work was written nearly twenty years earlier. In the summer of 1948, Columbia University invited Varèse to give a series of classes in composition and twentieth century music. He was invited by the State Department to conduct master classes in Darmstadt, Germany. Here he found a new generation of composers who were eagerly experimenting with the newly perfected magnetic tape recorder. He was hailed as the prophet of this new music, a man whose works intrigued the younger generation, as they "eagerly welcomed and tried to understand the new material Varèse offered in his teaching."³²

DÉSERTS: MUSIC WITH MACHINES

The revitalization of interest in Varèse's music was also the result of the release of a recording of his earlier works and the premiere of a new piece for an instrumental ensemble and electronic tape. Distribution of an EMS demonstration record, which included Cctandre, Integrales, Ionisation, and Density 21.5, spread the composer's name about a rather small circle of hi-fi buffs in 1950. Deserts, however, proclaimed to all who listened that Varèse had finally achieved the sounds

³²Frederic Waldman, "Edgard Varèse: An Appreciation," Julliard Review, Fall 1974, p. 10.

for which he had been searching.

The title Déserts was meant to convey all physical deserts, whether sand, sea, snow, empty streets, or the vastness of space, and also the deserts of the mind. Varèse wanted to suggest not only "barrenness, aloofness, timelessness, but also that remote inner space no telescope can reach, where man is alone, a world of mystery and essential loneliness."³³ Originally, Varèse had conceived what would today be called multimedia. There was to have been a film to visually describe the deserts, but it was never completed.³⁴ Nevertheless, Déserts remains an astounding work, portraying the composer's conception clearly and with deep emotional impact.

Déserts was conceived for two different media, traditional instruments and electronically processed sounds. These were contrasted in seven separate sections, alternating but never combining. After completing a plan of the work as a whole, Varèse began composing the instrumental portions in the summer of 1950. By 1952, he had completed the score, and began recording the sounds to be used in the taped sections. He continued, with the help of a technical assistant, to build a library of sounds from ironworks, sawmills, and factories until

³³Wilfred Mellers, Music in a New Found Land (New York: Alfred A. Knopf, 1965), p. 166.

³⁴Ouellette, Edgard Varèse, p. 181.

the summer of 1954. Varèse explained his penchant for these sounds as follows:

I have always looked upon the industrial world as a rich source of beautiful sounds, an unexplored mine of music . . . These noises were the raw material out of which, after being processed by electronic means, the interpolations of organized sound were composed.³⁵

After assembling his tape library, Varèse journeyed to Paris, where he had been invited by Pierre Schaeffer to complete his work at the studios of the Office de Radiodiffusion-Télévision Française (ORTF). The tape portion of Varèse's work was completed by the fall of 1954, and the work was premiered by the ORTF Orchestra on December 2, 1954, under the direction of Herman Scherchen. The performance was held in the Theatre des Champs-Elysees, where the debut of Stravinsky's La Sacre du Printemps had incited the famous riot forty years earlier, and was also broadcast stereophonically over the radio facilities of the ORTF network. The work, according to Varèse, stirred the audience into "most violent reactions, shrieks, swearing, and at the end, a thunderous ovation."³⁶

Déserts was one of the first works to combine taped sounds with traditional instruments, and it is the contrast between living performers and the sounds of

³⁵Mellers, Music in a New Found Land, pp. 165-66.

³⁶Yves Tinayre, "Varèse Composition Causes Furor in Paris," Musical Courier January 15, 1955, p. 36.

machinery that makes such a devastating impact on the listener. The alternating interpolations of sound, whether man or machine-made, interlock with uncanny precision. The overall shape of the work resembles an arched ABACABA form, where "A" stands for instrumental sections, "B" for taped music based on factory sounds, and "C" for taped music resembling percussion instruments, but altered electronically by reverberation, modulation techniques, and filtering.

Matters of pitch organization in Varèse's music, and Déserts in particular, have been described by several writers, most notably Chou Wen-Chung and Arnold Whittall. Pitch, of course, is one of the main characteristics of each sound mass that can be discussed. Wen-Chung, in "Varèse: A Sketch of the Man and His Music," has delineated Varèse's techniques of penetration, interaction, and transmutation in the opening measures of Déserts. The two initial sound masses, major ninths separated by a minor ninth (D-E, F-G), are "split open" by another mass inserted in their middle (C, A). By expanding the fifths toward each other, penetration occurs in m. 14 with the appearance of B-flat and B. Further expansion by fifths produces G-sharp and F-sharp by m. 21, where a "transmuted organization of the sound masses," (E, B-flat), continues to grow.³⁷

³⁷Chou Wen-Chung, "Varèse: A Sketch of the Man and His Music," pp. 160-62.

This continuous process of growth in Varèse's music can be seen on nearly every page of Déserts. Varèse often varies the rate of growth of the sound masses, producing pyramid-like structures of sound which swell to tremendous volumes, only to be released quickly (see Appendix: Example 3).

Again, later in the piece, the composer produces the same effect. Two similar pitch structures, F-B-F-sharp and A-flat-D-A, form the basis of the sound block. Using C and G as connecting tones, the wedge expands vertically in both directions from the central F. But instead of a quick release as before, a portion of the mass is sustained by the trumpets in m. 307 to provide foundation for the next blast of sound. Measures 308-9 contain the same pitch material, but the process unfolds at a quicker pace (see Appendix; Example 4).

A return to the opening measures also reveals the subtle differences in attack/decay characteristics which Varèse exploited. The steady state of the woodwinds is compounded by the attacks of piano, chimes, and xylophone, and then by chimes, xylophone, and cymbals (see Appendix; Example 5).

Again, in m. 175-78, Varèse utilizes the mallet percussion to supplement the staccato attacks of the clarinets. The difference in envelope characteristics between xylophone and vibraphone create subtle timbral

distinctions, as well as different initial attack/decay responses. (see Appendix; Example 6).

Besides choosing instruments with careful attention to envelope characteristics, Varèse shows a masterful ability to evoke unique timbral combinations from the instruments he utilizes. As mentioned earlier, he considered timbre to be an integral part of his compositions. Often, in Déserts and earlier works, he abandons melodic motion in favor of timbral distinctions only (see Appendix; Example 7).

Varèse uses this device at different points in the score to induce a feeling of repose, especially after raucous climaxes. The climactic section of the piece, according to Whittall, occurs in the measures following m. 243.³⁸ Out of a tumultuous mass of sound, F-sharp emerges and is passed about the group, producing subtle changes in sonority which attempt to resist the persistence of another lingering plane of sound in the lower brass. The F-sharp eventually dominates, leading to the final taped segment (see Appendix; Example 8).

The same process is evident at the end of the work, where E-flat emerges as the final pitch. It is interesting to note that the F-sharp of the preceding example, and the E-flat of Example 9 both relate to earlier material in that

³⁸Arnold Whittall, "Varèse and Organic Athematicism," Music Review 28 (November 1967): p. 313.

they are enclosed by the intervals outlined in the initial sound masses (see Appendix; Example 9).

Varèse also exploited extremes of instrumental range to achieve new timbres. Stravinsky has judged the composer as "an innovator of the first rank," who discovered "a new world of possibilities for the tuba."³⁹ In m. 69-70, a forte blast on low G-sharp from the Contra Bass Tuba resembles a fog-horn sound heard in the second tape section. Measures 135-36 require the instrument to play an even lower D at a pianissimo dynamic level. In a similar employment of the trombone, Varèse requests a low B-flat pedal tone in m. 100.

At the other extreme, Varèse also pushes the woodwinds to the upper limits of their range. At several points in the score, they vibrate in shrill clusters of pitches which produce combination tones below the written notes. A representative passage (see Appendix; Example 10), creates a new timbre as a result of the interaction between the two frequencies. Near the middle of the work, Varèse utilizes the entire woodwind section to produce a similar effect. The shrill upper register of the clarinets adds to the unique timbre established by combination tones (see Appendix; Example 11).

Varèse possessed a thorough knowledge of the limitations posed by traditional instruments and performers.

³⁹Igor Stravinsky, "Some Composers: Interview," Musical America (June 1962), p. 11.

Even though he complained about these limitations, he was creative enough to use them to his advantage. In m. 132-33, the composer combines a F at a forte dynamic level from the B-flat Clarinet with the same note played forte by the piccolo. The resulting difference in timbre and loudness is striking (see Appendix; Example 12). It would be impossible for the piccolo to sound as loudly as the clarinet is capable of playing, especially in the range utilized. By scoring the instruments in this manner, Varese exhibits his concept of progress in "opposing planes and volumes," which is created by "exactly calculated intensities."⁴⁰

As may be seen, Varese utilized dynamics as an independent and integral part of the compositional process. Example 12 demonstrates one facet of his attempt to create predetermined acoustical affects. At different points in the score, dotted lines are even drawn for each beat, so that crescendos and diminuendos can be more exactly specified. In other spots, the composer has written massive crescendos by staggering entrances, creating a crescendo by numbers (see Appendix; Example 13). This example not only achieves a huge level of sound, but the listener may also discern subtle changes in timbral quality as the level of loudness increases.

⁴⁰Ouellette, Edgard Varese, p. 183.

Near the end of the work, horns are added to the trumpets and trombones, producing an effect similar to Example 13 (see Appendix; Example 14).

Varèse's predilection for high levels of volume is readily apparent. Canby relates that the composer wanted ear-shattering levels of volume for the tape portions of Déserts when it was performed at Bennington College in 1955. He describes "the Varèse intention, expressed to me in so many words, was very simply to overwhelm the sound of live musicians with the greater power of the machine!"⁴¹ Zubin Mehta has observed that Varèse's work is "the only music where you can't hear a high C on the trumpet."⁴² But Varèse was also aware of the possibilities of fewer decibels. In an almost pointillistic manner, m. 199 asks the instrumentalists to play "as pp as possible—no vibrato—steady—all the instruments exactly on the same level of loudness."⁴³ (see Appendix; Example 15)

A portion of Déserts which exhibits striking sculptural qualities due to Varèse's sensitive use of dynamics appears in Example 16 (see Appendix). It has been visualized in a three-dimensional representation to

⁴¹Edward Canby, "Audio, etc.," Audio July 1955, p. 28.

⁴²Karen Monson, "A Varèse Sonic Spectacular," High Fidelity/Musical America, September 1971, p. 22.

⁴³Edgard Varèse, Déserts (New York: Colfranc Music Publishing Corporation, 1959), measure 199.

examine the dynamic shaping which the composer draws from the ensemble by plotting crescendos and diminuendos with dotted lines.

Varèse's music is also filled with interesting passages which contain a variety of rhythmic gestures. Example 17 (see Appendix) reveals the composer's mastery of rhythmic manipulation, as he utilizes only three pitches, but develops and extends his ideas in a very original manner. Later in the work, Varèse has written a rhythmic etude for percussion based on just two pitches for each instrument (see Appendix; Example 18).

Varèse's music obviously makes huge demands on the performer. Every facet of the score, from meter and tempo, to interval content, dynamic expression, and intonation requires integrity in performance. Varèse often complained of the limitations, "the distorting prism between composer and listener," that conventional notation and performance placed on his creativity.⁴⁴ He revealed his feelings to Gunther Schuller in 1965:

On an instrument played by a human being you have to impose a musical thought through notation, then, usually much later, the player has to prepare himself in various ways to produce what will— one hopes—emerge as that sound. This is all so indirect compared with electronics.⁴⁵

Of course, the control Varèse wielded over the

⁴⁴Frederic Grunfeld, "The Well-Tempered Ionizer," High Fidelity, September 1954, p. 40.

electronic apparatus which generated his composition was infinitely greater than he possessed in the above examples. His music, like any other using human performers, cannot always achieve the composer's intention. Depending on the player's ability to withstand the grinding of minor seconds in a high register, the combination tones mentioned above may or may not be sustained. Dynamic shaping and movement of sound are also dependent upon effective performance.

With all the control available to him in the taped sections of Déserts, it is puzzling to know that Varèse did not attempt to notate any of the sounds. After such great attention to detail in the instrumental notation, the taped segments are merely indicated in the score at points marked "OS", meaning organized sound. In the immense preparation of the tapes and subsequent early performances, however, a score was used. Frederic Canby, who was present at the final rehearsals when Déserts was performed in Bennington, Vermont, observed that the tape montage was often "conducted" by Varèse, who appeared to have "organized and memorized" every "plop, bang, and sizzle." Working with stopwatch in hand, Varèse's assistant, Ann McMillan, pored over the score which showed "at any given second of time lapse, there was a known and named tape idea being 'played' in one

track, or in the other, or both."⁴⁶

The massive job of selecting the few sounds used for the composition from the vast collection Varèse had assembled was completed largely in Paris. With the help of Ann McMillan and others, the inevitable copying and combining was undertaken using as many as nine recorders. A particular model of recorder, available only in Europe at that time, enabled Varèse to change speeds almost instantaneously and over a range of more than an octave. This technique accounts for the many siren-like sounds which appear in the final tape. Due to the lack of technology in the early 1950's, the early performances of the work suffered from a large amount of tape hiss, and the tapes "did not contain any 'highs' above approximately 5,000 cycles per second."⁴⁷ Varèse was not pleased with these first results, and worked eight years through two more versions before he finally achieved the desired sounds for Robert Craft's recording of the work by Columbia in 1962.⁴⁸

The taped segments of Déserts, taken on their own merit, constitute a powerfully imagined body of work. But the balance between the limitless power of the taped sounds and the complex instrumental sonorities is

⁴⁶Canby, "Audio, etc.," p. 38.

⁴⁷Ibid., p. 40.

⁴⁸Ouellette, Edgard Varèse, p. 190-91.

the composer's crowning achievement. Stravinsky has described the transitions between tape and instruments as exploiting "the border country between the live and the electronically attenuated suggestion of the live, and they [the transitions] are, I believe, the most valuable development in Varèse's later music."⁴⁹ The composer skillfully manipulates the instruments, most often percussion, to bridge what might otherwise be a wide gap in timbre. As a result, the work flows dramatically from section to section.

The tape portions of the work were conceived to symbolize "distance," or the "non-human aspects of the physical universe," which may partially explain the use of industrial sources.⁵⁰ The first interpolation of organized sound occurs at approximately three minutes into the work, and is characterized by loud hissings and groans which emerge from both channels. Short bursts of rhythmic motives move from side to side in repetitive sequences, while loud moans slide in and out of the texture. Varèse has isolated a sound resembling a metallic ratchet, possibly derived from a jack hammer, but treated electronically, which enters the sound mass at climactic points. A blast of reverberated foghorn, repeated three times at diminishing

⁴⁹Stravinsky, "Some Composers: Interview," p. 11.

⁵⁰Mellers, Music in a New Found Land, p. 166.

volumes, signals the return of the instrumental performers.

The second section begins with electronically modified percussion sounds, providing a connection between the human and non-human aspects of the work. Long cymbal rolls, which grow independently in each channel lead to reverberating metallic sounds and low frequency mutterings. The spacing of acoustical events is more open in this segment than the other two, creating a more relaxed atmosphere. One particular motive, a resonating metallic echo, provides thematic unity, until tension is increased by utilizing many different tempi and motives which develop interesting cross-rhythms. The resulting clamor leads directly into the next instrumental segment which answers the taped sounds with loud and dissonant chords, although tentative, attempting to assert human superiority.

The interesting timbral manipulations shown in Example 9 serve as the transitional material to the third taped segment, which lasts approximately three minutes. It begins with loud whines and shrill, high-pitched whistles that combine with bursts of noise to assert the superiority of the machine element. For a short time, purely electronic sounds are heard, followed by a blast from a pipe organ which has been cleverly distorted. The sounds build to a screeching climax, a long whine with much reverberation, that cues the return of the instrumental group. The huge masses of taped sounds are

answered only by percussion instruments playing at pianissimo. It is as if the human element has submitted to the superiority of the electronic sounds. After building to a confused state of violence, the music subsides into submissive repetition of a single pitch, finally disappearing into nothing (Varèse requests the conductor to beat the silence of the final measure).

Upon hearing Déserts, the listener may quickly note similarities between taped and live sounds. As mentioned earlier, the foghorn groan which cues the second entrance of the instrumental ensemble resembles an earlier motive in the tuba. Numerous motives, though not completely identical in content, are repeated three times in both portions. The metallic echo of the second section of organized sound is clearly related to m. 173-74, where the timpani repeats a G-sharp for ten quarter-note pulses. Taken as a whole, Déserts presents a beautifully organized, dramatic, flowing work where "the live music has assumed many characteristics of the taped music, and the taped music has started commenting in an intelligible way on the instrumental music."⁵¹

⁵¹"New York Philharmonic," Musical America, February 1964, p. 31.

THE LAST YEARS

With the success of Deserts, Varèse had taken "the portentous first step toward the liberation of music."⁵² The electronic instruments that Varèse worked with were "for him no more than a means, as the violin was for a Vivaldi." Even after these means were available to him, the composer remained aloof from any of the groups of activity in the field. He worked at both the ORTF and Columbia-Princeton studios, but still did not wish "to be associated with musique concrète or any other clique."⁵³ He scoffed at the term electronic music, declaring: "There is no such thing. There are, however, sounds treated electronically—sounds transposed, filtered, transmuted, mixed, and so on—and these are the materials of my compositions."⁵⁴ He also warned of the problems to be encountered in the new field:

. . . a machine can only give back what is put into it. It does not create . . . No matter how obedient a machine is, it will encounter situations for which it is not prepared. A bad musician with instruments will be a bad musician with electronics. An electronic instrument is an additive, not a destructive factor in the art and science of music.⁵⁵

⁵²Joseph Machlis, Introduction to Contemporary Music (New York: W. W. Norton and Co., Inc., 1961), p. 628.

⁵³Ouellette, Edgard Varèse, p. 148.

⁵⁴Edward Downes, "Rebel From Way Back," New York Times, 16 November 1959, p. 11.

⁵⁵Mellers, Music in a New Found Land, p. 165.

Shortly after Desérts was completed, Varèse received the opportunity to finally realize his dream of music as spatial movement. The architect Le Corbusier had been invited by the Philips Corporation to design a pavillion for the Brussels World's Fair of 1958. Despite the company's protests, Le Corbusier demanded that his friend Varèse produce the music for his creation. The resulting collaboration, entitled Poeme Électronique, contains both electronic and concrete sounds modified by tape manipulations and electronic devices. The music was distributed over four hundred twenty five loudspeakers embedded in the ceiling of the pavillion, and was controlled by fifteen separate tape tracks. As a result, sounds could sweep around in great circles above the listeners, combining with Le Corbusier's lights and visual effects to create a multimedia spectacle that was viewed by more than two million people. Sadly, the pavillion was demolished in 1958, despite the architect's efforts. Varèse's music remains, however, as a testament to the composer's genius.

Following the triumph of Poeme Électronique, Varèse became a world-famous leader in a field he helped to create. His last years were spent much like a master craftsman passing on his knowledge to younger apprentices. Without Varèse's contributions, many of the post-World War II musical developments would have been inconceivable. He was one of the first composers to have a thorough

scientific education, and was a central figure in the American experimental movement of the 1920's. His early works helped create a sensibility in other composers that needed to exercise itself in the electronic medium when the proper technology was made available. He was the first to musically mirror the sounds of the human and industrial world; the first to attempt to organize music spatially as well as temporally; he predicted the advent of electronic music and lived long enough to create some of the first masterpieces in the new music.

Varèse stands in the center of twentieth century musical history, linking the innovations of Debussy with the later work of Messiaen, Stockhausen, Penderecki, and Ligeti. Long after the debates over Expressionism, serialism, new-classicism, and aleatoric music have ended, Varèse's music continues to be a potent force. As a critic has commented: "In a world of jet planes, man-made moans, atomic submarines, and hydrogen bombs, who is to say this music does not have a place?"⁵⁶

⁵⁶"Contemporary Music—Recitals in New York," Musical America, December 1, 1958, p. 29.

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APPENDIX

Example 1. Edgard Varèse, Hyperprism, measures 5-10, brass only.

Musical score for Example 1, measures 5-10, brass only. The score is written for Horns I, II, III and C.B. Trb. in 4/4 time. The key signature has one sharp (F#). The score is divided into three measures. In the first measure, the C.B. Trb. plays a series of notes with dynamics *ff* and *pp*. In the second measure, the C.B. Trb. continues with dynamics *pp*, *ff*, and *fff*. In the third measure, the C.B. Trb. plays a sustained note with dynamics *sf* and *mf*. The Horns I, II, III part is mostly silent, with some notes in the second and third measures. Above the first measure, there is a bracket labeled "I." and above the second and third measures, there is a bracket labeled "II, III muted".

Musical score for Example 1, measures 5-10, brass only. The score is written for Horns II, III and Trbs. in 4/4 time. The key signature has one sharp (F#). The score is divided into three measures. In the first measure, the Trbs. play a series of notes with dynamics *pp* and *fff*. In the second measure, the Trbs. continue with dynamics *pp* and *fff*. In the third measure, the Trbs. play a sustained note with dynamics *ppp*. The Horns II, III part is mostly silent, with some notes in the second and third measures. Above the first measure, there is a bracket labeled "II, III" and above the second and third measures, there is a bracket labeled "8".

Example 2. Edgard Varèse, Ecuatorial, measures 8-11, brass only.

Musical score for Example 2, measures 8-11, brass only. The score is written for Trpts. I, II, III and Trbs. II, III, IV in 4/4 time. The key signature has one sharp (F#). The score is divided into four measures. In the first measure, the Trpts. I, II, III play a series of notes with dynamics *mf* and *pp*. In the second measure, the Trpts. I, II, III continue with dynamics *pp* and *f*. In the third measure, the Trpts. I, II, III play a sustained note with dynamics *p* and *pp*. In the fourth measure, the Trpts. I, II, III play a sustained note with dynamics *pp* and *pp*. The Trbs. II, III, IV part is mostly silent, with some notes in the first and second measures. Above the first measure, there is a bracket labeled "III." and above the second and third measures, there is a bracket labeled "II". Above the fourth measure, there is a bracket labeled "I". The Trpts. I, II, III part has a bracket labeled "flutter tongue" above the fourth measure. The Trpts. I, II, III part has a bracket labeled "pp" above the first measure and a bracket labeled "ppp" above the second measure. The Trpts. I, II, III part has a bracket labeled "pp" above the third measure and a bracket labeled "pp" above the fourth measure. The Trpts. I, II, III part has a bracket labeled "pp" above the first measure and a bracket labeled "ppp" above the second measure. The Trpts. I, II, III part has a bracket labeled "pp" above the third measure and a bracket labeled "pp" above the fourth measure.

Example 3. Edgard Varèse, Deserts, measures 115-117;
percussion omitted.

Musical score for measures 115-117 of Edgard Varèse's *Deserts*, percussion omitted. The score is written for seven instruments: Flute (Fl.), E-flat Clarinet (E^bcl.), B-flat Clarinet (B^bcl.), Horn (Hrn.), Trumpet (Tpts.), Trombone (Tbns.), and Tuba (Tba.).

The score is in 3/4 time and features a key signature of one flat (B-flat). The tempo is marked *Andante*. The score is divided into three measures: 115, 116, and 117. Measure 115 begins with a dynamic marking of *pp*. Measure 116 features a dynamic marking of *p*. Measure 117 features a dynamic marking of *fff*.

Key performance instructions include:

- Fl. I Take Picc. (Piccolo) in measure 117.
- Take Bass Cl. (Bass Clarinet) in measure 117.
- Open II, Open III, and Open I markings for the Trumpet (Tpts.) part.
- Open markings for the Trombone (Tbns.) and Tuba (Tba.) parts.

The score includes various musical notations such as slurs, ties, and dynamic markings (*pp*, *p*, *fff*).

Example 4. Edgard Varèse, Deserts, measures 304-9.
 percussion omitted.

♩ = 200

304 305 306 307 *lunga*

Picc. *pp* *fff* *lunga*

FL. *pp* *fff* *lunga*

E^bcl. *pp* *fff* *lunga* Take

B^bcl. *pp* *fff* *lunga* Take

Hns. *Open* *pp* *fff* *lunga*

Tpts. *Open* *fff* *lunga*

Tbns. *Open* *fff* *lunga*

Tbs. *Open* *fff* *lunga*

Hns. *ff* *fff* *lunga*

Tpts. *fff* *lunga*

Tbns. *fff* *lunga*

Tbs. *fff* *lunga*

Example 5. Edgard Varèse, Deserts, mesures 1-4.

1 $\text{♩} = 92$ 2 3 4

Picc. *fmp* *mp* *sfp*

Clar. *p* *sfp*

2. 2 Suspended Cymbals
high $\frac{3}{4}$
low $\frac{3}{4}$ *sonoro* *p* *l. v.*

3. Chimes (Tubular Bells)
Keep vibrating

4. Vibraphone

5. Xylophone *loco*

Example 6. Edgard Varèse, Deserts, mesures 176-78.

B \flat cl. *Take E \flat Cl.*
Take Bass cl.

1 Vib. *ppp*

2 Susp. cymb. high

3 B. dr.

4 Ong.

5 Xyl. *loco*

Example 7. Edgard Varèse, Deserts, measures 157-60.

The image displays a musical score for measures 157-160 of Edgard Varèse's *Deserts*. The score is arranged in a system with five staves. The top two staves are for Horns (Hrn.) and Trumpets (Tpt.), and the bottom three are for Trombones (Tbns.).

- Measure 157:** The Horns part begins with a circled note marked *f sonoro*. The Trombone I part has a circled note marked *fp*. The Trombone II part is marked *II. Muted* and *fp*.
- Measure 158:** The Horns part continues with a circled note marked *f sonoro*. The Trombone I part has a circled note marked *pp*.
- Measure 159:** The Horns part has a circled note marked *f sonoro*. The Trombone I part has a circled note marked *pp*.
- Measure 160:** The Horns part has a circled note marked *f sonoro*. The Trombone I part has a circled note marked *pp*.

Handwritten annotations include circled notes and arrows pointing to specific notes in the Horns and Trombone I parts. The score is marked with dynamics such as *f sonoro*, *fp*, *pp*, and *poco f*. The word *sonoro* is written above several notes, and *poco f* is written below the Trombone I part in measure 160.

Example 8. Edgard Varèse, Deserts, measures 246-53, percussion omitted.

Musical score for measures 246-250. The score includes staves for Picc., FL, E♭ cl., B♭ cl., Hns., Tbn., and Tbs. Measure numbers 246, 247, 248, 249, and 250 are indicated above the staves. Dynamics include *ppp*, *f*, *mp*, *p*, and *pp*. Performance markings include *soffro* and *pp* circled in measure 247. The key signature has one flat and the time signature is 4/8.

Musical score for measures 251-255. The score includes staves for Hns., Tpta., Tbn., and Tbs. Measure numbers 251, 252, 253, 254, and 255 are indicated above the staves. Dynamics include *mp*, *pp*, *p*, and *ppp*. Performance markings include *ten.*, *pp sub.*, and circled notes in measures 251, 254, and 255. A triplet of eighth notes is marked in measure 254. The key signature has one flat and the time signature is 4/8.

Example 8, cont.

Musical score for measures 256-259. The score includes parts for Flute (FL), E♭ Clarinet (E♭ cl.), B♭ Clarinet (B♭ cl.), Horns (Hns.), Trumpets (Tpts.), Trombones (Tbns.), and Tuba (Tba.).

- Measure 256:** Flute and E♭ Clarinet play a whole note chord. B♭ Clarinet has a circled note with a *p* dynamic.
- Measure 257:** Similar to 256. B♭ Clarinet has a circled note with a *p* dynamic.
- Measure 258:** B♭ Clarinet has a circled note with a *pp* dynamic. Trombones and Tuba have a circled note with a *pp* dynamic.
- Measure 259:** Similar to 258. Trombones and Tuba have a circled note with a *pp* dynamic.

Handwritten annotations include a circled *pp* in the Tuba part of measure 258 and a circled *pp* in the Trombone part of measure 259.

Musical score for measures 260-263. The score includes parts for Flute (FL), E♭ Clarinet (E♭ cl.), B♭ Clarinet (B♭ cl.), Horns (Hns.), Trumpets (Tpts.), Trombones (Tbns.), and Tuba (Tba.).

- Measure 260:** Flute has a circled note with a *f* dynamic. Horns have a circled note with an *mp* dynamic.
- Measure 261:** Flute has a circled note with a *f* dynamic. Horns have a circled note with an *p* dynamic.
- Measure 262:** Horns have a circled note with an *mp* dynamic. Trombones and Tuba have a circled note with a *steady* dynamic.
- Measure 263:** E♭ Clarinet has a circled note with a *steady* dynamic. Horns have a circled note with an *mp* dynamic.

Handwritten annotations include a circled *ps* at the end of measure 263, a circled *mp* in the Horns part of measure 262, and a circled *steady* in the Trombone part of measure 262.

Example 9. Edgard Varèse, Deserts, measures 313-25,
percussion omitted.

Musical score for measures 313-318. The score includes staves for Piccolo (Picc.), Flute (Fl.), Bass Clarinet (B^b cl.), Bass Clarinet (Bass cl.), Horns (Hns.), and Trumpets (Tpts.).

- Measure 313:** Picc. and Fl. start with *ppp*. Fl. has a dynamic marking *f*.
- Measure 314:** Fl. has a dynamic marking *f*.
- Measure 315:** Flute enters with the instruction "Take Flute".
- Measure 316:** B^b cl. has a circled note with *pp*.
- Measure 317:** Bass cl. has a circled note with *pp*.
- Measure 318:** Hns. has circled notes with "closed" and "Open" markings and *pp*. Tpts. has *ppp*.

Musical score for measures 319-325. The score includes staves for Flute (Fl.), Bass Clarinet (Bass cl.), Horns (Hns.), Trumpets (Tpts.), Trombones (Tbns.), and Tuba (Tba.).

- Measure 319:** Fl. has a circled note with *pp*.
- Measure 320:** Bass cl. has a circled note with *p*.
- Measure 321:** Hns. has a circled note with "Solo" and *p*.
- Measure 322:** Hns. has a circled note with "Solo" and *p*.
- Measure 323:** Fl. has a circled note with *pp*.
- Measure 324:** Fl. has a circled note with *pp*. Tpts. has a circled note with *pp*. Tbns. has a circled note with *ppp*. Tba. has a circled note with *pp*.
- Measure 325:** Fl. has a circled note with *pp*. Hns. has a circled note with *pp*. Tpts. has a circled note with *pp*. Tbns. has a circled note with *ppp*. Tba. has a circled note with *pp*.

Additional markings include "Open" for Hns. and Tba., and "Beat the silence" above measure 325.

Example 10. Edgard Varèse, Deserts, measures 85-92,
flute and piccolo only.

Musical score for measures 85 and 86, Flute (Fl.) and Piccolo (Picc.). The score is in 3/4 time with a key signature of one sharp (F#). Measure 85 features a Piccolo part with a dynamic marking of *pp* and a *subito* instruction. Measure 86 features a Flute part with a dynamic marking of *pp* and a *subito* instruction. Both parts have long horizontal lines indicating sustained notes or rests.

Musical score for measures 87, 88, and 89, Flute (Fl.) and Piccolo (Picc.). The score is in 3/4 time with a key signature of one sharp (F#). Measure 87 features a Piccolo part with a dynamic marking of *pp*. Measure 88 features a Flute part with a dynamic marking of *pp*. Measure 89 features a Piccolo part with a dynamic marking of *pp*. Both parts have long horizontal lines indicating sustained notes or rests.

Musical score for measures 90, 91, and 92, Flute (Fl.) and Piccolo (Picc.). The score is in 3/4 time with a key signature of one sharp (F#). Measure 90 features a Piccolo part with a dynamic marking of *pp*. Measure 91 features a Flute part with a dynamic marking of *pp*. Measure 92 features a Piccolo part with a dynamic marking of *ppp*. Both parts have long horizontal lines indicating sustained notes or rests.

Example 11. Edgard Varèse, Deserts, measures 149-51,
woodwinds only.

Musical score for woodwinds (Piccolo, E♭ Clarinet, and B♭ Clarinet) in measures 149-151 of Edgard Varèse's *Deserts*. The tempo is marked $\text{♩} = 80$. The score features a *pp subito* dynamic marking. The Piccolo part is in the upper register, while the E♭ Clarinet and B♭ Clarinet parts are in the lower register. The music consists of sustained notes with some melodic movement in the Piccolo and E♭ Clarinet parts.

Example 12. Edgard Varèse, Deserts, measures 132-4,
percussion omitted.

Musical score for woodwinds (Flute, E♭ Clarinet, and Clarinet) in measures 132-134 of Edgard Varèse's *Deserts*. The tempo is marked $\text{♩} = 80$. The score includes instructions: "Take Picc." for the Flute part and "Take E♭ Cl." for the E♭ Clarinet part. The Flute part is marked (Picc.) in measure 134. The music consists of sustained notes with some melodic movement in the Flute and E♭ Clarinet parts.

Example 13. Edgard Varèse, Deserts, measure 161,
percussion omitted.

Musical score for Example 13, measure 161 of 'Deserts' by Edgard Varèse. The score is for Tpts. (Trumpets) and Tbns. (Tubas). The notation includes various dynamics such as *ppp*, *pp*, *p*, and *fff*, along with 'Open' markings. The music is written in a single measure with a complex rhythmic structure.

Example 14. Edgard Varèse, Deserts, measures 292-94,
percussion omitted.

Musical score for Example 14, measures 292-94 of 'Deserts' by Edgard Varèse. The score is for Hns. (Horns), Tpts. (Trumpets), and Tbns. (Tubas). The notation includes various dynamics such as *ppp*, *pp*, *p*, and *fff*, along with 'Open' markings. The music is written in three measures with a complex rhythmic structure.

Example 15. Edgard Varèse, Deserts, measure 199, percussion omitted.

198 $\text{♩} = 50$ As pp as possible - no vibrato - steady all the instruments
199 exactly on the same level of loudness tr...

198 199

Picc. *ppp* *ten.* Take Picc. *ppp*

Fl. *ppp* *ten.*

E♭ cl. *ppp* *subito* *ppp* *ten.*

B♭ cl. *ppp* *ten.*

Hrn. *Solo* *p* *5* *Sord.* *ppp* *ten.* *ppp*

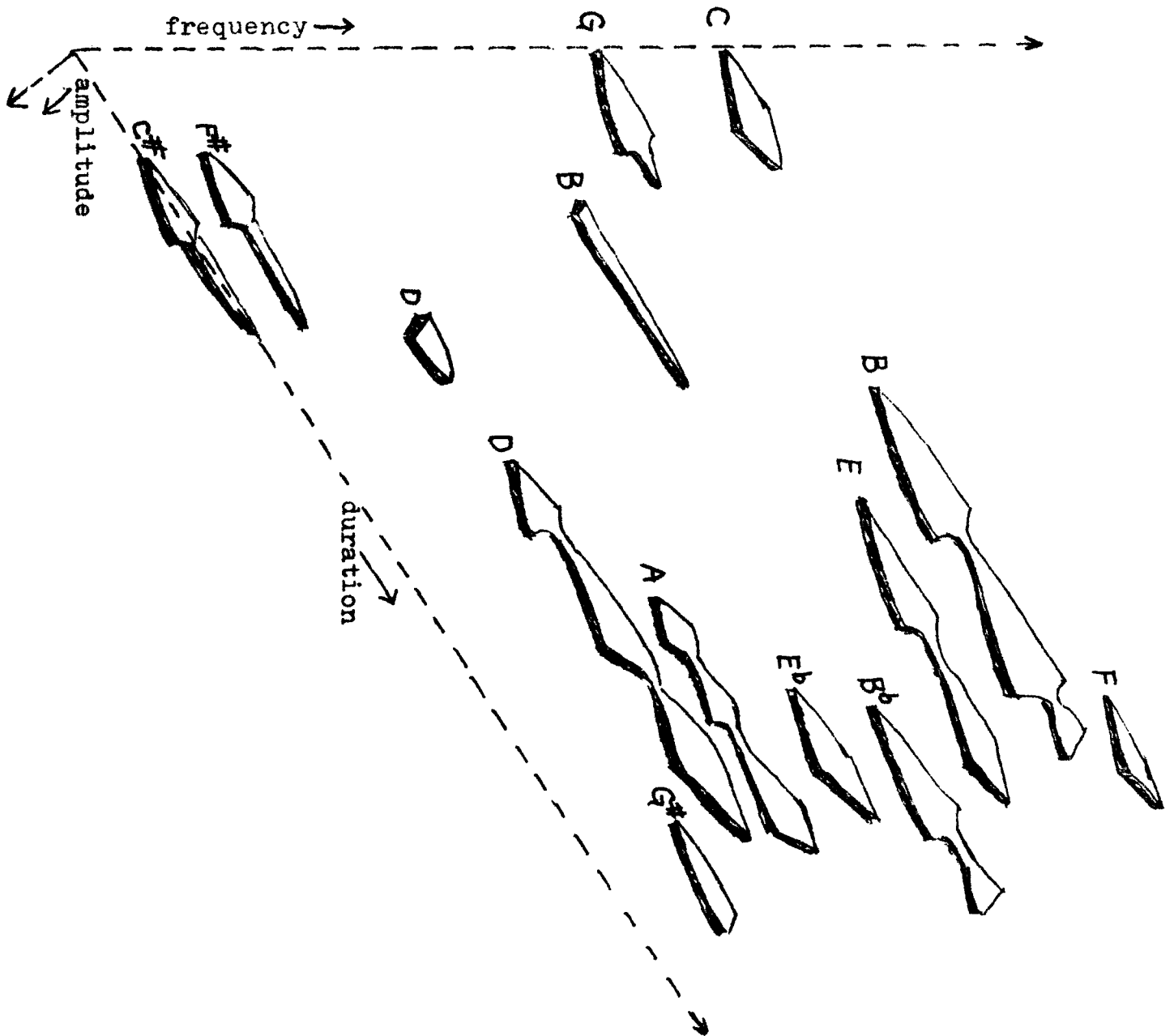
Tpta. *I. Sord.* *ppp* *ten.* *ppp*

Tpta. *III. Sord.* *ppp* *ten.* *ppp*

Tbn. *p*

Pf. *ppp legalissimo e ten.* *no 92.*

Example 16. Edgard Varèse, Deserts, measures 41-5,
percussion omitted.



Example 17. Edgard Varèse, Deserts, measures 118-20.

Tempo: $\text{♩} = 50$

Measures: 118, 119, 120

Parts: Bass, Horns, Trpts.

Measure 119: sfz , p

Measure 120: p , sfz , *closed by a*

Example 18. Edgard Varèse, Deserts, measures 296-303.

Parts: 1 Timp, 2 Susp. cymb, 3 Clav., 4 Gong, 5 Xyi.

Measure 296: f very sharp, pesante, secco

Measure 297: ff , p L. v. and die out

Measure 303: ff sharp, marcatisissimo

Example 18, cont.

1 Temp.

2 Susp. cymb.

3 B. dr.

4 Org.

5 Xyl.