THE THEORETICAL TREATISES OF
JOSEF MATTHIAS HAUER

DISSERTATION

Presented to the Graduate Council of the
North Texas State University in Partial
Fulfillment of the Requirements

For the Degree of

DOCTOR OF PHILOSOPHY

By

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Denton, Texas
August, 1980

This study makes available in English translations the three most important theoretical writings of the Austrian composer Josef Matthias Hauer (1883-1959), whose experiments with atonal and dodecaphonic music are discussed in the treatises. The treatises are *Vom Wesen des Musikalischen: Grundlagen der Zwölftonmusik*, *Vom Melos zur Pauke: eine Einführung in die Zwölftonmusik*, and *Zwölftontechnik: die Lehre von den Tropen*. In addition to the translations and commentary the dissertation includes a sketch of Hauer's career and an examination of his claim that he—not Arnold Schoenberg—was the inventor of the dodecaphonic school of composition.

An experimenter by nature, Hauer had a predilection for mathematical constructions and developed a system of composition according to "tropes," or chromatic scalar patterns without repeated notes. His theory of tropes first appeared in an article, "Saen und Ernten," of 1921, and was soon followed by three more extensive theoretical publications, which elaborately explained his theories. In the first of these, *Vom Wesen des Musikalischen*, of 1923, Hauer formulated his "Twelve-tone Law" which he called the "Nomos of the atonal melody." He also included a thorough discussion of his views on the relation of tone and color, and on a new system of notation which first
appeared in this treatise.

In 1925 Hauer published his second treatise, *Vom Melos zur Pauke*, which is primarily an apologia for his twelve-tone compositions. In this treatise are described Hauer's four main styles of compositional textures. The third treatise, *Zwölftontechnik*, also dating from 1925, presents Hauer's polyphonic compositional techniques. Here the tropes are discussed in greater detail and are presented in twelve tables which contain all the possible combinations of the twelve equal-tempered tones.

From 1914 until the time of his death in 1959, Hauer worked intermittently as conductor, teacher, and composer in Vienna, where some of his works were performed and published. A listing of his extant compositions may be found in Appendix A of the study. From among the few works available, three were selected and analyzed according to the theories formulated in Hauer's treatises. The works studied include one piece taken from each of his three compositional periods: *Nachklangstudien für Klavier*, Opus 16, the *Sechste Streichquartett*, Opus 47, and the *XXII Zwölftonspiel*. 
During the past half-century the evolution of twelve-tone music and its subsequent expansion to all sorts of applied serialism has represented one of the main thrusts of contemporary music. The general attribution of the invention or early development of these ideas to Arnold Schoenberg has obscured the contributions of the little-known Austrian composer-theorist Josef Matthias Hauer. Hauer's writings on twelve-tone music reveal to a certain extent his development of a process that, like Schoenberg's, used all twelve notes, but remained, unlike Schoenberg's, uninfluential: in part because of their obscure explanations, and in part because of Hauer's querulous personality.

The basis of this study is a translation of Hauer's three main writings: *Vom Wesen des Musikalischen: Grundlagen der Zwölftonmusik*, *Vom Melos zur Pauke: eine Einführung in die Zwölftonmusik*, and *Zwölftontechnik: die Lehre von den Tropen*. The availability of these works in English should help make Hauer's ideas better known to students of the twelve-tone idea and may help to bring about a reassessment of Hauer's contribution to the art.

In the translation of Hauer's treatises an attempt has been made to retain the author's writing style and
general tone. His short paragraphs, some of which consisted of only one sentence (he may have done this for emphasis), are maintained in the translations. All comments and notes in the translations which appear in oblique brackets [ ] are those of the translator and are not by Hauer, who often uses the regular bracket [ ]. The original page numbers of the treatises are placed in the left-hand margin of each page. In Hauer's own footnotes the page numbers refer to this original numbering. Translations of other materials than the treatises themselves are the author's unless otherwise specified in a footnote. Included in the translation of Vom Melos zur Pauke are a number of underlined words; these are emphasized by Hauer and appear in spaced type in the original German.

In Vom Wesen des Musikalischen Hauer often refers to "Diagram A, B, C, or D." These diagrams may be located in the appendix of Vom Wesen. To the 1966 edition of this treatise, Victor Sokolowski added a number of other items (charts, diagrams, and music) from Hauer's estate.
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CHAPTER I

JOSEF MATTHIAS HAUER:

HIS LIFE AND WORKS

Throughout the history of music there have occurred pairs of composers who have often striven toward the same goals and often used the same compositional tools. There have also been composers whose influence led their contemporaries to fame, while they themselves have remained relatively unknown. At the present time the conception and propagation of twelve-tone music is primarily connected with the name of Arnold Schoenberg, but recent studies have revealed that there were several other composers,¹ among them Josef Matthias Hauer, who similarly devised methods of composition with the twelve chromatic tones of the tempered scale. There is factual evidence that these men developed their systems contemporaneously with or prior to that of Schoenberg. The prominent Austrian composer and musicologist Egon Wellesz has discussed the interaction between Hauer and Schoenberg:

¹Arnold Schoenberg, Josef Hauer, Jefim Golyscheff, Fritz Heinrich Klein, and Herbert Eimert all began to compose "atonally" in the first decade of the 1900's. However, Hauer was the first to compose while consciously using all twelve tones of the chromatic scale. He was also the first to publish his discoveries.
You will remember that there is a parallel to this event /Hauer's influence on Schoenberg/ between Erik Satie and Claude Debussy. It was Satie who was the first French composer to introduce chains of unresolved sevenths and ninths, and who drew Debussy's attention to Maeterlinck's play, Pélleas et Mélisande, which he himself had wanted to set to music, but had not the means to buy the libretto. It was, however, Debussy who succeeded in developing all the elements which were in Satie's music and in writing to this libretto an opera, which was the supreme achievement of a great composer.

Something similar happened with regard to Hauer's twelve-tone music. He succeeded in composing a choral work which, in 1924, caused a sensation at the music festival in Frankfurt. But in spite of his great talent he was prevented by his lack of technique from becoming a great composer. However, he provided Schoenberg with the principal idea, the row of twelve tones as a new principle of composition.

Josef Hauer (he added his father's surname, Matthias, to his own name in 1922) was born on March 19, 1883, in Wiener Neustadt, an industrial town about fifty kilometers south of Vienna. He was the son of Matthias Hauer, a prison warden, and Maria Wallner Hauer. Hauer's ancestors had been vine-dressers in the region of Kaiserslautern, and settled in Piestingtal (in the neighborhood of Wiener Neustadt) at the command of the Empress Maria Theresa. The name "Hauer" was derived from "Weinhauer" or Weinbauer," which reflected the family's occupation. The forebears of Maria Wallner Hauer originated in Hungary.

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Very little is known about Hauer's childhood, which was spent at his birthplace. He did receive music instruction, however, according to the following narrative from his essay, Deutung des Melos of 1923:

My parents lived in an old monastery in which an elementary school was also housed. At the age of five I wanted to go to school since I thought I was big and smart enough. With crying and tears, I begged my mother to send me. In order to placate me, my father decided to teach me the zither. Soon I could tune the instrument, and had learned to recognize the circle of fourths and fifths, the keys and their accidentals. This so impressed me, that one day I, too, attempted to transcribe for zither a piece which I had heard on a barrel-organ.

After attending grammar school, Hauer entered the Wiener Neustadt Teacher's Training College in 1897 to prepare himself for a profession in elementary education. At the same time he completed his musical education through private instruction as well as autodidactic studies. In addition to studying harmony and counterpoint he learned to play the piano, organ, violin, and cello. He also composed a string quartet as well as some church music, all of which predates his earliest surviving compositions by at least seven years. (The first extant works are pieces for piano

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or harmonium, the Tragödien des Sophokles dating from 1911, and songs to texts of Friedrich Hölderlin.\textsuperscript{6}

After five years' study Hauer left the training college in 1902 to take up his first teaching post in the village of Krumbach. There he renewed a long-standing friendship with the poet-philosopher, Ferdinand Ebner, who was also from Wiener Neustadt. In 1904 Hauer recognized him on a train to Vienna, where both were going to take the state teachers' qualification examination. After passing an additional test, Hauer was permitted to teach catechism in grammar school, and was subsequently transferred to Wiener Neustadt, where he taught until his final pensioning in 1919.\textsuperscript{7}

At first Ebner held a position in Waldegg, but in 1912 he was transferred to Gablitz near Vienna, where it was very easy for him to continue his close relationship with Hauer, since the latter had married in 1907 and moved to Vienna with his family. Hauer had met his future wife, Leopoldine Höning, while he was teaching at Krumbach. She had been on vacation there with her mother. They were married on February 18, 1907, in Wiener Neustadt, when she was not quite nineteen years old. Three children resulted from the union: Martha, Bruno, and Elisabeth. At the present time Bruno is


\textsuperscript{7}Ibid.
active as a composer of popular Viennese songs, as music publisher, and as record-producer in Vienna. Leopoldine died on October 16, 1934, while still quite young; Hauer survived her by twenty-five years. 8

Hauer began composing seriously in Krumbach. His friend Ebner mentions in his Lebenserinnerungen of 1931 that Hauer's new "Mass in the Style of Beethoven" was performed in Herzogenburg about the year 1914. The following excerpt depicts Ebner's close contact with Hauer:

In the bourgeois desert of the small town, in the spiritual waste of the college circle, he, Hauer, was searching for 'fellow-creatures'—and was thus in a similar situation as I—so we often came together on Saturdays and Sundays in Neustadt. We played duets at the piano as well as Beethoven Sonatas. Not only was Hauer working on piano technique, but he was also studying counterpoint with the half-blind musician and composer, Kaindl. 9

In the years 1906, 1907, and 1909, Hauer took three state teachers' examinations which qualified him to teach voice, violin, and piano both at the secondary school and at the teachers' seminars. It was also at this time that a group of teachers, lawyers, and students began to meet regularly at the Cafe Lehn (no longer standing) in Wiener Neustadt to discuss the arts. Both Ebner and Hauer, then

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8Walter Szmolyan, Josef Matthias Hauer; eine Studie (Vienna, 1965), 10.

twenty-eight, belonged to this gathering. Through his radical views on music Hauer shifted the center of attention to himself; soon a "Hauer table" was a regular part of the cafe scene. There the wholly unconventional ideas which were to influence his creative language began to take shape, especially during the years 1911 and 1912. In his essay, Säen und Ernten of 1926, Hauer mentions this metamorphosis in a backward glance:

At the age of twenty-eight I could celebrate my spiritual rebirth. . . . One day I suddenly began playing a kind of music which I had previously heard only in my dreams.

As most of Hauer's friends and acquaintances did not understand this music, only a few encouraged him to write down what they heard him play. Ebner writes:

At the beginning of the year 1913, Hauer surprised us with a new composition, his 'First Symphony.' Later he titled it Nomos I. . . . Often these horrible dissonances appear to be melodies, not yet unfolded, but compressed within a chord. . . . For the moment I cannot help feeling that in this work an embryonic, primeval manifestation of musical creation has taken place.

The performance of Nomos I, later published as Opus 1 with the designation, Nomos in sieben Teilen, took place on June 7, 1913, at St. Pölten and was the first of Hauer's works to be presented publicly. Rudolf Reti, the Viennese pianist, composer, and theorist, had become interested in

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10 Stuckenschmidt, op. cit., 71.
11 Lichtenfeld, op. cit., 2.
12 Ibid.
13 Ebner, op. cit., 1061.
Hauer and with a colleague, Robert Freistadt, agreed to perform the symphony in an arrangement for two pianos. Although the music was wildly applauded by the audience, the critics' response ranged from negative to scathing.

In 1913 Hauer wrote a second Nomos as well as the Apokalyptische Phantasie (both were originally titled "symphony" and were scored for piano and strings) besides several minor works. It was Ebner who gave Hauer's third symphony the name Apokalyptische Phantasie. Concerning it, Ebner writes:

The composition of this symphony was quite a special event for Hauer. For a long time he was unable to find a suitable ending. He was vexed... Then one day while he was at school, he went over and stood by the window without paying any attention to the children. The more he looked out the window, the more the children romped around making an uproar. But he heard nothing. Suddenly, he hit upon the ending and came back to reality.

The third symphony had its premier on May 9, 1914, as part of a "Modern Music Evening" which Hauer had organized in Wiener Neustadt. As before, Reti played the piano score with the composer assisting at the harmonium. Unfortunately, Hauer's music did not find so friendly a public reception as in St. Pölten. Ebner commented on the concert:

14 Szmolyan, op. cit., 16.
15 Stuckenschmidt, op. cit., 72.
16 Ebner, op. cit., 1062.
Bewildered, the people of Neustadt listened, but did not clap. It was a complete failure. The local critics annihilated him, and the people of Neustadt laughed him to scorn. No one took him seriously.17

One of the local papers printed the opinion that "from the pathological standpoint, Hauer's creative action is without doubt that of an abnormally talented man."18 The "mad" music teacher from Wiener Neustadt, however, was not disconcerted by apparent failure. In 1914 he composed his first set of Hölderlin-Lieder, which included the Hyperions Schicksalslied, as well as five choral songs taken from the Tragödien des Sophokles. In the same year he also composed a Kyrie eleison for piano and strings.19 Ebner relates, "After I brought Hölderlin to Hauer's attention, he began to compose the Hölderlin-Lieder. Many years later he declared to me that from that time onward he had found himself unable to consider any other poet for his musical settings."20

Using Hölderlin's verses, Hauer also assembled the texts of his two large cantatas, Wandlungen (Opus 53, composed in 1927), and Der Menschen Weg (Opus 67, of 1934).

The outbreak of the First World War brought an end to Hauer's first creative period. Despite medical reports about

17Ibid., 1065.
18Ibid.
19Stuckenschmidt, op. cit., 72.
20Szmolyan, op. cit., 18.
his poor health, Hauer was called into the military, serving first at Vienna, then at Atzgersdorf, and finally returning to Vienna, where he was employed in a government office of the High Command as a clerk on account of his beautiful handwriting. Due to a weakened condition he was discharged from the military service in 1918, and in 1919—after a brief resumption of his teaching duties—retired at the age of thirty-six.\textsuperscript{21} In 1915 Hauer had moved his family to Vienna, where he was to live until the end of his life. Though needy, he refused an offer to perform as cellist in the Vienna Philharmonic Orchestra. In 1923 Arnold Schoenberg recommended him as an urgent case to an American institution which had been set up to aid needy musicians.

The years 1918 and 1919 were most important to Hauer's creative development. At the beginning of 1918 he became acquainted with the architect Adolf Loos who brought him in contact with the Schoenberg circle. Later in the same year while collaborating with Ebner, Hauer produced his first theoretical work, \textit{Über die Klangfarbe}, which he himself published. In 1923 he issued it in an expanded form with the title, \textit{Vom Wesen des Musikalischen}.\textsuperscript{22} Here Hauer developed his views concerning the "color effect of music," which he derived out of the interval ratios:

\begin{itemize}
\item \textsuperscript{21}Lichtenfeld, \textit{op. cit.}, 3.
\item \textsuperscript{22}Szmolyan, \textit{op. cit.}, 20.
\end{itemize}
Within every harmonic series, one overtone is the most prominent. The musical character of the tone-color is determined by the ratio of the interval to the fundamental. Therefore the quintessence of any tone-color is determined by two tones (the simplest chord) and its interval ratio. 23

The Apokalyptische Phantasie proved quite suitable for the verification of Hauer's theory on tone-color, which he later published in 1918 as Opus 13 in Über die Klangfarbe. In connection with this, the acquaintance of Hauer with the Swiss painter, Johannes Itten, was important. Hauer had met him in May of 1919 while visiting an exhibition of Itten's paintings in Vienna. Hauer stated that the "meaningless" pictures of Itten corresponded to his "atonal" method of composition, and the artist in turn was impressed by Hauer's color circle. Here Hauer had arranged the twelve colors according to musical principles which he determined through connections with the circle of fourths and fifths. Later this twelve-part color circle took a central position in Itten's color theory, 24 which is laid down in the book, Künst der Farbe (1961). Ebner made a note of the meeting of both "intuitive" artists:

Itten came to visit Hauer—I was present—and had the Apokalyptische Phantasie played for him. Full of enthusiasm, Itten declared: Those are my

23Hauer, Vom Wesen des Musikalischen (Vienna, 1923), 9.
pictures which Hauer composes! Later on, the painter presented Hauer his great "Apokalyptische Color Phantasie," which now hangs over Hauer's piano--to the great horror of all 'philistine' visitors.25

During the years 1918 and 1919 Hauer wrote several more piano pieces, and upon Ebner's recommendation he set to music the final words of the Aeschylus tragedy, *Der gefesselte Prometheus*, for voice and piano. These compositions were issued in a new notation which Hauer had designed and published for the first time in *Vom Wesen*.26 More importantly the summer of 1919 brought a new development: Hauer discovered the "law of the twelve tones" and began to explore its system. In the article "Die Tropen," which appeared in 1924 in the *Musikblättern des Anbruch*, Hauer described how he had suddenly found the "Twelve-tone-law" by studying his own compositions:

In August 1919 I chanced upon the idea of analyzing my greatly maligned compositions in order to find a perceptible "practical" law within them. Up until then I had worked mostly by instinct, following only my inspiration. . . . I asked myself the question: in principle, what are you actually doing, and what have others done? How does your train of musical thought differ from the traditional? . . . After a long while I finally arrived at the most simple thing: I counted the various tones of the individual building stones (form-elements)--and discovered that there were always more than the seven of a major or minor key--at least nine, ten, eleven, or even all twelve. . . ."27

25Ebner, op. cit., 1074.

26Szmolyan, op. cit., 28

27Ibid., 31.
The first evidence of this changing style may be noted in Nomos, Opus 19—the first work in which Hauer knowingly and consistently made use of his concept of a twelve-tone law. His second creative period, which encompasses everything up through Opus 89 and lasted for twenty years, begins with this work.28 It is also at this time that Hauer began to seek out Schoenberg and discuss the project of writing a textbook together, but this was never to come about. The relationship between the two composers is discussed in the next chapter.

With the change in Hauer's compositional style, his old friend Ebner could no longer offer enthusiastic support. A break between the two friends came in 1920, Ebner stating that he did not want to be part of what he foresaw as "provoking the end of music." Near the end of his Lebenserinnerungen Ebner writes:

I had not broken off the relationship to Hauer without a sense of guilt, and there were times when this weighed heavily on my mind. . . . Whether he is a musical charlatan as many maintain, or an engineer, I know not. However, what I do know is that in his compositions there occur measures which a charlatan could not compose and which are not merely constructed by an engineer.29

28 Lichtenfeld, op. cit., 3.
29 Ebner, op. cit., 1080.
In time other friendships came to the forefront. The painter Erwin Lang introduced Hauer to a jeweller, Erich Köchert, who generously financed the composer in times of need. Most of the autographs and first editions of the works, Opus 1 through Opus 89, as well as a handwritten catalogue of works sketched by Hauer, the Köchert-Verzeichnis, are still in the possession of the Köchert family.

Just as Ebner had previously directed Hauer to the poetry of Hölderlin, so Lang turned Hauer's attention to the work of the Sinologist Richard Wilhelm, whose translations of Chinese philosophical books quickly made a great impression of him. The influence of the Chinese culture and philosophy became more prevalent in his theories—especially the Book of Changes (I Ching) which contained startling analogies to Hauer's own thought processes. Hauer considered the Chinese to be the "most musical folk on earth," since they—at least in one specific historical epoch—had realized the predominance of music over politics, law, religion, morals, art, and science. At that time every educated man—whether poet, painter, scholar, minister, or emperor—had to be above all a good musician if he wanted to

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30 Lang painted several excellent portraits of Hauer as well as a large group portrait of Köchert and his wife Gertrud, several other friends, and Hauer seated at the cello.

31 Lichtenfeld, op. cit., 3.
fulfill his duty to the state and to society. Hauer's love for the Chinese culture went so far that he began to identify his theories in considerable detail with the teachings of the old Chinese philosophy books. It was his view that the twelve Lü's of the Chinese tone-system corresponded exactly to the twelve half-tones of the equal temperament, and even that the forty-four provinces of the old Chinese empire corresponded to the forty-four tropes of his twelve-tone system.

Between 1921 and 1922, Hauer produced a great number of compositions which are all based on his system of the tropes. Hauer remarked in Säen und Ernten that these pieces were written in the delirium of having gained a mastery of this technical material. These are for the most part piano pieces, but a few new Hölderlin settings are also included. At first Hauer gave these works the opus

32 Ibid., 12.

33 As early as the third millennium B.C. China may have had a "Pythagorean" tone-system. This is based upon the legend that in 2697 B.C. the Emperor Huang-ti sent his minister Ling Lun to cut a set of twelve bamboo panpipes, each of which was one-third shorter than the preceding one. All twelve tones could be derived from the main note "huang chung." See Chou Wen-Chung, "Chinese Historiography and Music: Some Observations," The Musical Quarterly LXII (1976), 224-225.

34 Lichtenfeld, op. cit., 12.

35 See page 59 for an explanation of the system of tropes.

36 Szmolyan, op. cit., 56.
numbers 20 through 67, but later he rejected the numbering and published the piano works simply as Opus 20, titled *Atonal Music*. These pieces appeared in print in 1922.

In 1923 and 1924 Hauer wrote additional *Hölderlin-Lieder* (Op. 23 and 24) as well as many piano pieces (Opus 25). Earlier he had declared that his atonal music could be performed only on tempered instruments and by the human voice. That he subsequently relaxed his views is evidenced by the content of the treatise, *Vom Melos zur Pauke*, which dates from this time. Opus 26, which was originally conceived as a composition for piano, became a quintet for clarinet, violin, viola, cello, and piano. After composing pieces for solo instruments (clarinet, violin, cello) and piano, Hauer wrote his First String Quartet (Opus 30), which was first performed in Donaueschingen—together with works of Schoenberg and Webern in 1924. Hauer's Opus 31, an orchestral suite, received its first performance also in 1924 at the Music and Theater Festival of Stadt Wien in the Grossen Konzerthausaal.\(^{37}\)

During the years from 1923 to 1925 a young composer, Hermann Heiss, came to Vienna from Darmstadt to study under Hauer. He soon became a devoted friend and collaborator; the work title *Zwölftontechnik: die Lehre von den Tropen* is dedicated to Heiss and emanated out of their work.

\(^{37}\)Ibid., 58.
Heiss is almost the only disciple to have fruitfully developed Hauer's teaching. Heiss's principal contribution lay in an extension of Hauer's ideas by introducing into them a new application of rhythmic principles similar to later developments known as "total serialization."

By this time Hauer had achieved several successes—first with the performance of his *Seventh Suite for Orchestra*, Opus 48, at the Music Festival of the International Society of Contemporary Music of 1927 in Frankfurt am Main. Another success was achieved in 1928 on the occasion of the performance of his Hölderlin cantata, *Wandrungen*, Opus 53, at the chamber music festival in Baden-Baden. In 1930 Otto Klemperer set up a concert performance at the Krolloper in Berlin consisting of selections from Hauer's seven-part opera, *Salambo*, Opus 60, which had been adapted from a novel by Flaubert. In the same year, the violin concerto, Opus 54, was presented to the public at the International Society of Contemporary Music Festival in Brussels. A second stage work was produced in 1931, the German Singspiel, *Die Schwarze Spinne*, Opus 62, after the morality play by Jeremias Gott helf. Hauer had been awarded the Künstler-preis of the city of Vienna in 1927, and from 1930-1938 the city paid him a regular honorarium. It was also at this time that the Russian Commissar, A. Lunatscharski, became very interested in the

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38 Stuckenschmidt, op. cit., 76.

39 Lichtenfeld, op. cit., 5.
composer and obtained an appointment for him at Leningrad. Hauer, however, declined the offer.  

The turbulent political climate of the 1930's brought a premature end to the public activities and works of Hauer. The cultural policy of the Nazis rejected his music as a "decadent and degenerate art" which was "dangerous to the state." After the Anschluss in 1938 he found himself in dire straits because his teacher's pension and honorarium had been terminated. Although forced to live on a smaller pension, in part supported by a small circle of close friends, his creative strength remained unbroken.

1939 saw the composition of the Zwölftonmusik für Orchester, Opus 89, the last composition with an opus number. This work marks the breaking point between Hauer's second and third creative periods, and after this time Hauer composed only "Twelve-tone Games" which he differentiated partly by numbering, partly by dating. He composed some thousand twelve-tone games in this final period which lasted from 1939 to 1959, the year of his death. Only a few of these pieces were published--the majority by Hauer's son through the Unterhaltungs-Music-Verlag Fortissimo.  

Although Hauer never enjoyed the notoriety of his countryman, Schoenberg, the end of World War II was marked  

40 Ibid., 6.  
41 Ibid.
by a new wave of publicity for him. Essays and magazine articles were written by Otto Basil, Johann Muschik, and L. W. Rochowanski. Hauer's long-time colleague Johannes Schwieger established a Hauer-Institute, while his pupil, the harpsichordist Victor Sokolowski, organized a Hauer-Studio. Ilona Steingruber and Elisabeth Höngen interpreted his lieder in concerts and radio broadcasts, Hermann Scherchen performed the Wandlungen in Vienna for the first time in 1951, and Hans Rosbaud directed the premiere of the Hölderlin cantata, Der Menscheweg, Opus 67, in the Viennese concert hall in 1953. Other honors followed: in 1954 an honorary title of professor was granted to Hauer as well as the "Prize for Music of the City of Vienna," and in May 1956 the "Grand Prize of the Austrian State" was awarded to him.43

In 1955 H. H. Stuckenschmidt visited Hauer in Vienna where he was living in an old house in Josefstadt that had belonged to him before World War I. Stuckenschmidt relates that a tall man resembling an old Chinese philosopher with white hair and a long beard opened the door. Hauer was dressed in a nightshirt, for "that was the day which he

42 Ibid., 7.
43 Ibid.
spent in bed, thinking and composing." Immediately he began a conversation about modern music and about Thomas Mann, whom he attacked vehemently. He showed Stuckenschmidt piles of compositions and manuscripts from which only a few pages had been published by Fortissimo. These pieces, he noted, were not music, for music had died long ago, but mathematical games. "When you have looked through them," he told Stuckenschmidt, "throw them away; I write a new one every day."

44 Ibid.
45 In 1948 the distinguished Nobel Prize winning novelist, Thomas Mann, published Doctor Faustus, a novel whose central character is a composer of twelve-tone music. Mann printed an introductory statement explaining that the twelve-tone system was actually the intellectual property of Arnold Schoenberg, and that passages of the book were taken from Schoenberg's Harmonielehre. Schoenberg declared that Mann had stolen his literary property and ascribed his creation to another person, while insisting that future generations would consider Thomas Mann the creator of Schoenberg's theory. Much to the dismay of Hauer, neither acknowledged that Hauer had developed a system of twelve-tone composition before Schoenberg. In a letter dated February 19, 1949, however, Mann revealed in a correspondence with the widow of a philosopher, Paul Bommersheim, that he knew of Hauer and had "intentionally suppressed his name" so as not to "irritate the ailing man." See "Thomas Mann über Joseph Matthias Hauer: Ein bisher unveröffentlichter Brief," Neue Zeitschrift für Musik I (1960), 11.

46 Stuckenschmidt, op. cit., 79.
It became apparent to Stuckenschmidt during the interview that Hauer had rejected the modern world and had made, from a philosophical standpoint, a lifelong sacrifice to his convictions. It seemed that every alliance with the powers of this world was repugnant to him, for Hauer received his few honors after 1945 almost grudgingly. Graciously he accepted the homage of his own small circle, but no other. As the visit with Hauer ended, Stuckenschmidt reflected upon the contents of a leaflet which Hauer had read to him:

Absolute, cosmic music permits the deepest insight into the way of the world. The notes with their harmonics are sums with their planets. The solar systems 'temper' one another; the tensions between them arrange themselves with compelling necessity to create the harmony of the spheres. Twelve-note patterns perform the functions of the Milky Way, being the energizing and formative centers of organic processes. Absolute music is a link with eternity, it is religion, intellectual reality as opposed to all the different denominations, philosophical systems and political ideologies. Music and mathematics are of one and the same stamp! If they develop away from their origins and from each other, then there arises on the one hand emotional dreariness and musical nonsense, and on the other, a sense of contrivance and experimentation. Organically developed true twelve-note music must be discernible from twelve-note composed humbug and fashionable noise devised for entertainment and edification.47

47 Ibid.
CHAPTER II

THE RELATIONSHIP TO ARNOLD SCHOENBERG

While Arnold Schoenberg's "method of composition with twelve tones, related only to each other,"¹ found world-wide dissemination—especially in the years after the Second World War—Josef Matthias Hauer's method has remained almost unknown. Hauer did not have the great musical pupils, such as Anton Webern, or Alban Berg, to carry on his work as did Schoenberg. Although he too had "pupils," or "disciples," gathered around him, these were not musicians. Instead they were sculptors, poets, architects, judges, and philosophers—people who felt magically drawn to him by his fascinating personality. That is not surprising when one considers that Hauer's theories not only include a new compositional method, but also lay claim to being a general spiritual principle, the "revealing of the regulation of the world in the Melos."²

Although Hauer attempted several times to come into closer contact with Schoenberg, the greatest amiability did not always exist between the two composers. In 1913 after Schoenberg had achieved a great success with the first

¹Title of Schoenberg's compositional method, which avoids the term, "atonal."

²Hauer's phraseology for his method of composition.
performance of his Gurrelieder in Vienna, Hauer wrote to him, apparently hoping for an opinion of his own compositions. Schoenberg, then working in Berlin, referred Hauer instead to his more accessible pupils living in Vienna:

Dear Sir: Berlin, June 23, 1913

Due to my move, I have been unable to find the time to answer your letter until now.

Concerning your intention to visit me in Berlin, kindly note that I will be in Berlin only until July first, and may return around August 18th or 20th. I really don't know, however, if your visit with me will be very profitable for you. I am in too much doubt myself just now concerning artistic matters, and especially the technical things, to be able to give you reason to hope for a noteworthy opinion.

Perhaps it would be more advantageous for you to get in touch with my pupils and friends, Dr. Anton von Webern and Alban Berg, who live in Vienna. They are certainly less tired than I am presently, and therefore will certainly react reliably to new music.

Let me hear soon what they say to you. Then if you think that it is important to come, we can talk it over. In any case, it takes courage to compose, and when one has something to say, one must despise praise like the faultfinder.

Respectfully yours,

Arnold Schoenberg

In the summer of 1917 Hauer visited with Schoenberg. In his book, Musik in der Zwangsjacke (1959), Alois Melichar published a letter from Hauer concerning this encounter. Schoenberg, it appears, had adversely criticized the unison

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3Walter Szmolyan, Josef Matthias Hauer; eine Studie (Vienna, 1965), 40-43.
passages in the Hölderlin-Lieder as well as the frequently occurring cadences in the First Symphony. He acknowledged however, that Hauer might be "gifted."^4

Early in 1918 Hauer became acquainted with the poet Hermann Bahr, who called public attention to him in his "Tagebuch," which appeared every Sunday in the Neuen Wiener Journal. Also at that time, Hauer became acquainted with the famous architect Adolf Loos, who often visited with Arnold Schoenberg and his circle. Loos endeavored to procure Hauer's admittance to the closed performances of the "Society for Private Musical Performances" founded by Schoenberg, to which entrance was obtained only by presenting an identity card with a current photograph of the bearer. Finally in 1919 Hauer was permitted to attend these performances, and later some of his own compositions were even performed there. On February 23, 1919, Rudolph Reti performed Hauer's Nomoi, while on May 30th of the same year, Eduard Steuermann interpreted the Sieben kleinen Stücke für Klavier, Opus 3, and probably also the Tanz, Opus 10. These works were not performed to the satisfaction of Hauer, who suspected that Steuermann had deliberately sabotaged them. A less-than-sympathetic Ebner recounts:

In 1919 at one of Schoenberg's closed concerts, several of Hauer's piano compositions were played by

^4Szmolyan, op. cit.
the pianist Steuermann—among them the awful Nachtstück. He played so poorly, however, that Hauer left the room. His wife and I were not far behind. The next day Hauer wrote a short letter to Steuermann dictated by me, in which he said nothing other than that Steuermann had played B-flat in the third measure of his Nachtstück when he ought to have played B-natural (a mistake Steuermann had actually made).

In spite of an outward manifestation of tolerance and good-naturedness between Hauer and Schoenberg, their relationship soon became strained due to feelings of rivalry and envy. Hauer studied Schoenberg's Harmonielehre, which he had borrowed from Reti. He was soon convinced that he had already solved in his own work, Über die Klangfarbe, many of the problems raised by Schoenberg. In a series of letters he laid down a detailed critique of Schoenberg's book which was later printed and distributed among his friends, including Ebner.

In his Harmonielehre Schoenberg included a footnote which rails against the expression, "atonal," a term which some say originated with either Hauer or Ebner. At the

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5 Ebner, op. cit., 1070.
6 In these letters mention is also made of a visit with Anton Webern which took place on January 9, 1919, in Modling, where Hauer and Webern eagerly discussed Hauer's theories. Ibid.
8 Szmolyan, op. cit., 31.
same time, however, Schoenberg spoke of Hauer with great respect and designated him as a composer whose theories, although they led to exaggerations, might be deep and original, and whose courageous conduct made him worthy of esteem in every respect. Schoenberg also made a more cogent remark which, though somewhat correct, angered Hauer: "Hauer's works appear more as examples of theory than actual compositions themselves."^9

During the years of the First World War, many artists and musicians were reduced to dire poverty. Americans had founded a fund to assist needy German and Austrian musicians, and Schoenberg had been called to serve on the honorary committee. In a letter dated April 24, 1923, Schoenberg cited Berg, Webern, and Hauer as the most urgent cases of need and commended them to the institution for help.10 Toward the end of 1923 Hauer initiated a new correspondence between Schoenberg and himself. Two of Schoenberg's replies have been printed in the collection of Schoenbergiana edited in 1958 by Erwin Stein. First of all Hauer proposed that they should found a school of twelve-tone music together while Schoenberg expressed the wish to

9Ibid., 44. For additional comments by Schoenberg on Hauer's theories, see pp. 209-213 of Style and Idea.

collaborate on a textbook of twelve-tone technique. A discussion for the review of these projects was arranged for December 10, 1923, in Schoenberg's Mödling residence.\(^{11}\)

Dear Mr. Hauer:

Mödling, December 1, 1923

Your letter gave me very, very great pleasure. And I can give you proof of this. The fact is that about one and a half or two years ago I saw from one of your publications that you were trying to do something similar to me, in a similar way. After coming to terms with the painful feeling that someone else, by also being engaged in something I had been thinking about for well-nigh fifteen years was jeopardizing my reputation for originality, which might cause me to renounce putting my ideas into practice if I do not want to pass for a plagiarist—a painful feeling, you will admit—after having come to terms with this feeling and having come to see wherein we differ from each other, and that I was in a position to prove the independence of my ideas, I resolved to make the following suggestion to you:

Let us write a book together, a book in which one chapter will be written by one of us, the next by the other, and so on. In it let us state our ideas, exactly defining the distinctive elements, by means of objective (but courteous) argument trying to collaborate a little bit in spite of these differences: because of what there is in common a basis can surely be found on which we can get along smoothly with each other.

And I meant to say also: let us show the world that music, if nothing else, would not have advanced if it had not been for the Austrians, and that we know what the next step must be. . . . Perhaps now, your suggestion of a school is even better. Above all, because in that way an exchange of ideas would come about spontaneously, more frequently, and without the agitatory contributions of a public maliciously looking on and provoking one to stubbornness. But the idea of the book, for the purpose of establishing the present point

\(^{11}\)Ibid.
of view, should not be completely rejected either. In my Harmonielehre I argue (on page 488 of the new edition) against the concept 'atonality' (against the term, I mean, not against the thing itself!) and then continue with an appreciation of you personally. My friends will be able to confirm, too, that although I have put my head down and charged like a bull at what I am opposed to in your ideas, in conversation I have acknowledged your achievements at least as much as I have done in my book.

Perhaps you yourself will name some afternoon next week when you would care to visit me. I am looking forward very much to the further development of our understanding and remain with kindest regards, yours sincerely,

Arnold Schoenberg

Concerning the outcome and consequences of this discussion, nothing more is known. Apparently they were unable to demolish all resentments. Neither the plan of a joint school nor that of a textbook to be published together was realized. In January 1925 Hauer's article "Die melische Tonkunst" appeared in the journal, Der Auftakt, in which Hauer quoted from the above mentioned correspondence with Schoenberg:

With Schoenberg I have adapted the device 'Composition with twelve tones,' or 'Possibilities of logical fashioning with the utilization of twelve tones.' Schoenberg adds that there are also possibilities for the one who does not count it necessary to have all twelve tones of the equal temperament for correct, pure, musical fashioning. Therein we

differ, since the pure Melos of these twelve tones is the whole content of music, in which all other possibilities, ALL, are contained. For me, the Melos of the twelve well-tempered tones is the SUBSTANCE of music—the rhythmic, harmonic, and polyphonic meaning—the FORM. These different interpretations are probably based only on our personalities. Schoenberg begins from the vertical approach while I always start out from the horizontal, monodic line, and derive all the harmony, chords, and polyphony of my music from there. Stronger contrasts between musical personalities are thus scarcely conceived. Schoenberg once said to me: 'We have both found the same diamond, but you look at it from one side and I from the opposite.' I answered him: 'Many can view the diamond from all sides.'

Hauer continually stressed his priority as the creator of the twelve-tone law of music, but consistently felt himself neglected or overlooked. When twelve-tone music was first performed in 1924 at the Donaueschinger Musiktagen, the program consisted of Schoenberg's Serenade, Opus 24, Webern's Sechs Bagatellen für Streichquartett, Opus 9, Hauer's Hölderlin-Leider, Opus 12, and his Fünf Stücke für Streichquartett, Opus 30. Full of bitterness, Hauer wrote to a friend, Heinrich Burkard:

I consider it a poor arrangement of heaven that at this time both Schoenberg and Webern were included, who occupied most of the time—especially with the press, who now works for them with strength. The

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13 Szmolyan, op. cit., 49.

14 The Webern work and the Hölderlin-Lieder both antedate the formulation of the twelve-tone theories and hence, although nontonal and chromatic, they do not qualify as twelve-tone pieces.
critics know that Schoenberg has snatched up my twelve-tone music (for example, in his Serenade) and since they are hateful as well as spiteful, they will not even let me keep this first birthright.\textsuperscript{15}

There were, however, other views on the subject. Theodor Wiesengrund-Adorno described Hauer’s music in the Musikblättern des Anbruch of 1929 as "that other attempt, which in addition to Schoenberg’s method, wears the name, 'Twelve-tone Composition,' and is not only mistaken for it, but indeed disputes his Schoenberg’s right to the priority." He also addressed Hauer as a "Perpetual Motion Composer."\textsuperscript{16}

In spite of the superficial similarities of the music visible to the contemporaries of Hauer and Schoenberg, there were considerable differences of compositional approach between the two composers. Although the idea of a twelve-note pattern was born with Hauer, he failed to gain recognition partly because he used the system rather rigidly, and at times, unimaginatively. Schoenberg made no claim of universal application, as did Hauer, and set no limit to the series as a system. Hauer consistently divided each row of twelve tones into two hexachords and grouped all the series having the same notes in each of the hexachords into a class called a trope. Schoenberg’s method of material preformation was based on the supposition that all of the

\textsuperscript{15}Ibid.
\textsuperscript{16}Ibid.
transformations of the basic row should remain identical "so that it may be adequately recognizable, and on the basis of certain characteristics it is able to guarantee and establish unity in diversity." For Schoenberg, each arrangement of the twelve tones was valid only for the particular composition of one or more movements for which it was selected. The technique of hexachordal mirror construction (combinatoriality) preferred by Schoenberg during his American period clearly refers to the segmentation demonstrated in the Hauerian tropes. Aware of the difficulty of avoiding octaves and false relations of the octave when using combinations of various forms of the tone-row, Schoenberg attempted to eliminate this problem by constructing special tone-rows. These were usually built so that the original version had a special relationship with the inversion at a fifth below. The first six notes in the original (Ex. 1a) were made to occur as notes 7 to 12 of the transposed inversion, (1d) but in different order. Similarly notes 7 to 12 in the original (1c) formed the first six notes of the transposed inversion, (1b) again ordered differently. This meant that the inversion transposed to a fifth below could be used as an accompaniment to the original series, with the maximum

17 Lichtenfeld, op. cit., 89.

18 Ibid., 88.
guarantee against producing octaves, as long as the two series moved more or less in parallel. Hauer, on the other hand, rarely inverted his hexachords but utilized serial manipulation and permutation up until the 1940's when he began composing the twelve-tone games.

Ex. 1. Combinatoriality.

Not only was Schoenberg more strict than Hauer in preserving the order of the notes in the tone row, he also avoided suggestions of tonality and turns of melody which would be reminiscent of harmonies in the same key. In contrast Hauer frequently outlined major-minor seventh chords as well as chromatic half-steps which gave a distinct,

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20Karl Henry Eschman, *Changing Forms in Modern Music* (Boston, 1945), 106.
if momentary, tonal aspect to his music. Some later application of similar tonal techniques to twelve-tone music was used by Schoenberg's disciple, Alban Berg.

In view of recent developments in avant-garde music, Hauer has emerged as more radical and modern than Schoenberg. While Schoenberg, conscious of tradition, composed and enriched his technique around those things which accrued out of the practical experience of historical material, Hauer turned determinedly away from traditional music and toward a conscious rejection of tradition—especially of the musico-historical development after Bach.\textsuperscript{21} Schoenberg never dispensed with the traditional forms and notation which he utilized with his row technique, but Hauer, especially in his last works, heralded the free form derived from an aleatoric compositional style. Form and structure of an entire work were deemed inherent in the material of Hauer's chosen row. Even the selection of the row was conceived of an action determined by fate, ruled by a deck of twelve cards or a pair of dice whose faces represented the notes of the chromatic octave. With reference to the ritual procedure found in the Chinese book of fortune, \textit{I Ching}, Hauer threw dice for the row succession—a procedure which John Cage later included in his compositions and under whose influence it became a standard part of aleatory music.

\textsuperscript{21}Lichtenfeld, op. cit., 42.
An enumeration of the differences between Hauer and Schoenberg gives rise to another consideration which concerns the notation of their music. Schoenberg apparently never intended to abandon the traditional notation, but as early as 1919 Hauer had designed a new notation—a species of tablature that represented the piano keyboard. This innovation avoided the use of accidentals, as well as the enharmonic spellings common to chromatic notation. Since 1950 composers have increasingly utilized new notational symbols or even entirely new systems, but before 1919 such novelties were regarded as eccentric, or were completely disregarded.22

In spite of the many differences between Hauer and Schoenberg they did find a common attraction in number manipulation and symbolism. Hauer considered music and mathematics to be the source of highest knowledge, a primordial and indispensable unit. He designated them as various forms—music as language, mathematics as writing—the Divine Revelation. Besides numbers, other musical measurements and ratios were perceived as a copy of superposed "cosmic" proportions.23 In connection with his twelve-tone game, Hauer once said, "Music died long ago;


23Lichtenfeld, op. cit., 12.
now it is only a game of mathematics." Numbers exerted a similar forceful effect on Schoenberg. It is well known, for example, that he was a victim of triskaidekaphobia—the fear of the number thirteen. In the title of his incomplete opera, Moses und Aron, he omitted the second "A" in the name, "Aaron," so that the number of the letters would add up to twelve rather than thirteen. Furthermore, he had an inexorable fear that he would die on the thirteenth of the month—which he did—July 13, 1951, at the age of seventy-six (7 + 6 = 13). (His date of birth had been the thirteenth of September, 1874!)

As in the case with Schoenberg, Hauer's original theories are kept alive by friends and pupils from his last years who function as their guardians and keepers. Hauer's son Bruno has published many of his father's works in connection with Fortissimo-Verlag, which he directs. Among those few musicians to whom Hauer personally introduced his system, only Hermann Heiss and Othmar Steinbauer achieved prominence; both, however, soon departed from his orthodox teaching. While Heiss is recognized as a representative of electronic music, Steinbauer, who died in 1962, built his own compositional system on the fundamentals of the Hauerian discoveries, the so-called "Klangreihenlehre" (sound-row theory).
The question of who actually wrote the first atonal music may never be answered satisfactorily. Schoenberg claimed that his Six Little Piano Pieces, Opus 19 of 1911, were non-tonal, while Hauer declared that his Nomos (Opus 1) predated them even though it was not published until 1912. Reginald Smith Brindle suggests, however, that Schoenberg's Opus 19 deals not with atonality, but only with obscured tonality. He points out that twenty-four notes of the first piece occur before Schoenberg uses all twelve pitches of the chromatic scale. Only the first seven notes are all different. It appears that he used only a fairly chromatic tonality—E (major and minor). It is obvious, then, that the note-order of this piece in no way anticipates serial principles, nor adheres to the concepts of total-chromatic writing. However, many of Hauer's early published works, such as the Nachklangstudien, Opus 16, also display the same characteristics, and may be analyzed as being in a key with obscured tonality.

24 Brindle, op. cit., 182

At this point it should be noted that Webern's Six Bagatelles for String Quartet, Opus 9, appeared only a year later (1913), and that they contrast in every aspect with the pieces of both Schoenberg and Hauer. "Melodically, the Bagatelles contain no more than brief phrases—connected not in a classical manner, but with isolated note groups usually spanning a large intervallic range. . . . Webern's Opus 9 has little immediate affinity with traditional archetypes and already anticipates the pattern of serial music of a considerably later period." See Reginald Smith Brindle, Serial Composition (New York, 1975), 183.
Besides Schoenberg, Hauer also corresponded with other early twelve-tone composers, including the Austrian, Fritz Heinrich Klein, and Herbert Eimert. In his 1924 *Atonale Musiklehre*, Eimert repeatedly alludes to the early twelve-tone experiments of the Russian, Jefim Golyscheff. Golyscheff was supposed to have written a *Trio* in 1914 which predates any attempts at twelve-tone composition by either Hauer or Schoenberg; however, the music has been lost. 26

It is highly probable that the second decade of the twentieth century saw Hauer formulate first the idea of using all twelve tones of the chromatic scale as a set, and that Schoenberg’s ideas developed from this germ, while Schoenberg had already experimented with the notion of atonality before he came in contact with Hauer. Until this time, as we cited above, both composers shared the common bond of a "free atonal" style. In the midst of all this compositional controversy Hauer still asserted that he was the one true innovator of the twelve-tone system, and after 1937, when all words and correspondence had failed to do him justice, Hauer stamped all of his letters and manifestos with the following:

> J. M. Hauer, the discoverer and unfortunately the only connoisseur and creator of twelve-tone

music (in spite of many poor imitations), which cannot be 'composed,' but must be grasped purely by intuition, and studied as the oldest language and the highest form of education.27

CHAPTER III

NOTES ON THE THREE TREATISES

Unfortunately, the theoretical writings of Hauer, for the most part out of print, provide little information for the study of his compositional techniques. They were written before he accumulated the essential mastery of his later creative styles—especially, the twelve-tone game, so characteristic of his last period.

As we indicated earlier, three creative periods clearly emerge. The first, lasting up until 1919 and including Opus 18, could be designated as the "period of free atonality." It is oriented toward his tone-color theory which he expounded in his first writings, Über die Klangfarbe (1918), and Vom Wesen des Musikalischen (1920 and 1923). The second period, beginning in 1919, in which Hauer uses the twelve-tone law consciously for the first time, starts with Opus 19. In 1921 he discovered the forty-four tone combinations which he called tropes, and calculated that these could be arranged in 479,001,600 different ways. The two theoretical works Vom Melos zur Pauke and the Zwölftontechnik both date from this time. After 1939 when Hauer assigned his last opus number to a composition
(Zwölftonmusik für Orchester, Opus 89), he entered his third and last creative phase. The twelve-tone game was the culmination of these efforts. A strict, total organization and determination of all components of the music are characteristic of this period.

Concerning the treatises themselves, it should be noted that in each of the three there is a change of literary style. The formal, philosophical writing found in Vom Wesen des Musikalischen is due in part at least to the style of the poet-philosopher, Ferdinand Ebner, who assisted Hauer in its composition. Vom Melos zur Pauke, on the other hand, is somewhat more direct and written in a conversational tone. It was created by Hauer alone. The Zwölftontechnik, resulting from a collaboration with Hauer's pupil, Hermann Heiss, contains more theoretical material and is written in a straightforward manner.

Vom Wesen des Musikalischen: Grundlagen der Zwölftonmusik

An earlier version of this treatise, titled Über die Klangfarbe, was first issued in 1918. In 1923 it was republished in a greatly amplified form titled Vom Wesen des Musikalischen. Writing this work with the assistance of Ebner, Hauer expounded his views on the "color-effect of music," which he had derived from the interval ratios. Contrary to the common idea concerning tone-color, Hauer
equated a certain color to an interval—not an individual tone—as did many other composers, including Schoenberg and Webern.

Within each harmonic series, one overtone stands out most strongly. . . . The ratio of the fundamental to the interval determines the musical character of tone color. The quintessence of any tone-color is therefore determined by two tones and their interval ratio.¹

In *Vom Wesen* Hauer compares the "naturally" limited tone-colors of the musical instruments with the tone-colors produced by the spirit. He conceives the musical interval as a "spiritual movement" or as a "manifestation" which has to express a certain something. To him, the highest state of spiritualization in music is attained in the equal use of all intervals. Hauer mentions further that the exclusive use of major and minor scales signifies the "natural (imitation of nature) condition" of music and that the equal use of all intervals is only possible in tempered tuning. As a result of the nature of orchestral instruments, natural colors predominate in the orchestra. Since intervals based on the odd-numbered harmonics predominate in the natural tone row, the color

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effect of the intervals may be realized perfectly only on the tempered instruments (piano, organ, and harmonium).\textsuperscript{2}

In order to clarify what he means by the "significance" of the interval, Hauer gives several examples, whereby he emphasizes that the choice of c as the starting-point (thus an absolute pitch) does not play so important a role as many believe; that is merely a convention and habit of the physical ear. In addition, Hauer goes through the whole circle of fifths, and not only gives certain color values and characteristics to the individual intervals, but also arranges them by setting the interval circle in relation with the color circle. (Ex. 2)

\textsuperscript{2}Walter Szmolyan, Josef Matthias Hauer; eine Studie (Vienna, 1965), 25.
Ex. 2. Hauer's Scheme of the Light and Tone-color Circles.  

<table>
<thead>
<tr>
<th>Increase of Warmth</th>
<th>White light</th>
<th>Yellow</th>
<th>Orange</th>
<th>Vermilion</th>
<th>Crimson</th>
<th>Scarlet</th>
<th>Purple-violet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warm colors</td>
<td>White light</td>
<td>Yellow</td>
<td>Orange</td>
<td>Vermilion</td>
<td>Crimson</td>
<td>Scarlet</td>
<td>Purple-violet</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Plus side</th>
<th>White light</th>
<th>Yellow</th>
<th>Orange</th>
<th>Vermilion</th>
<th>Crimson</th>
<th>Scarlet</th>
<th>Purple-violet</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C</td>
<td>I</td>
<td>G</td>
<td>P5</td>
<td>D</td>
<td>M2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>II</td>
<td></td>
<td></td>
<td>III</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td></td>
<td>M6</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>IV</td>
<td></td>
<td>E</td>
<td>M3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>V</td>
<td></td>
<td>B</td>
<td>M7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>VI</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Decrease of Warmth</th>
<th>Black</th>
<th>Blue-violet</th>
<th>Ultramarine blue</th>
<th>Turquoise blue</th>
<th>Blue green</th>
<th>Metallic green</th>
<th>Light (yellow) green</th>
<th>White light</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold colors</td>
<td>F-sharp</td>
<td>A4</td>
<td>D-flat</td>
<td>m2</td>
<td>A-flat</td>
<td>m6</td>
<td>E-flat</td>
<td>m3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hauer's tone-color series of fifths "closes" only in a circle of equal-tempered tuning. If pure fifths are considered, the twelfth of these fifths is higher by the Pythagorean comma (about one-eighth of a tone) than the starting tone. Hauer regarded this "spiral of fifths" as an unusable phenomenon.

3Ibid., 26.
Ex. 3a. The Equal-tempered Circle of Fifths.

Ex. 3b. The Spiral of Fifths.

The physical and psychological relationships between colors and sounds (chromesthesia) have been the subject of numerous studies. Physically, both the pitches of the musical scale and the colors of the optical spectrum are vibrations of specific frequencies. The frequencies of audible sound range from about sixteen to 20,000 cycles...
per second; those of visible light, from about 450 to 780 million million cycles per second. The latter two figures do not relate well to the ratio of 1:2—that of the octave—and therefore Hauer compared the colors of the visible spectrum (from red to violet) not to the entire audible musical scale, but only to an octave. However, the spectrum, unlike the musical octave, lacks the identity, or at least, similarity of its lower and upper end.

The chief studies in this field are those of Newton (1700), Goethe (1810), and Helmholtz (numerous essays, 1860–1880). Hauer firmly believed in Goethe's Theory of Colors which he amply cited in order to make analogies and corroborations of his own theories. The "Doctrine of Colors" was first published by Goethe in 1810 in two volumes with sixteen plates. The book was divided into three parts: didactic, controversial, and historical. Hauer's quotations from the Theory of Colors were generally taken from the first part of the book.

4 Some acousticians have tuned forks running up to c_{124} with 33,488 cycles per second. See William Braid White, Piano Tuning and Allied Arts (Boston, 1964), 14.

The tendency to equate tones and colors reached a peak during the first half of the twentieth century. Scriabin's *Prometheus* is scored to include a "keyboard of light," throwing colors on a screen. Schoenberg composed a color score to accompany his short, allegorical music drama, *Die glückliche Hand*. Edward MacDowell heard a particular color for each key; Rimsky-Korsakov and Alexander Scriabin drew up key-color charts, agreeing that D Major is yellow and E Major is blue, sapphire, or bluish-white. They disagreed sharply over C Major, which Rimsky-Korsakov heard as white and Scriabin as red. and F Major, which Scriabin also thought of as red, while Rimsky-Korsakov called it green. In his own color chart Hauer lists a "Promethean tone" or interval (c to f-sharp) which may refer to Scriabin's "mystic" chord (c, f-sharp, b-flat, e, a, d) that was the basis of his *Prometheus, Poem of Fire* (for large orchestra, piano, organ, choruses, and color organ).

Schoenberg and Webern also formulated a color idea in their "Klangfarbenmelodie," which was first used in

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7Hauer, *op. cit.*, 34.
Schoenberg's *Five Orchestral Pieces*, Opus 16, of 1909. "Klangfarbe," meaning "tone-" or sound-color," is the German equivalent of "timbre," and here the idea of "sound-color," may have had some relation to visual color. The melody, instead of being played by one instrument and then another, or the two in counterpoint, is passed through continually changing timbres in groups of tones or single tones from instrument to instrument. In such music each instrument is given an almost equal value and opportunity, dispensing with solo and accompaniment. Perhaps Hauer was ridiculing the concept of the "Klangfarbenmelodie" when he wrote the following passage in *Vom Wesen*:

> The comprehension of the individual tones produced by various instruments as the "organic" whole of the melody became doubtful, and was at last lost entirely. . . . It will certainly occur to no musician to imagine that a melody performed in this manner is musical—when each tone is played by another instrument.  

Finally, color associations are also common in Oriental music, where they are part of the cosmologic symbolism. Although this is far removed from the subjective and psychological approach of Western music, it may well have

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8 *Yates, op. cit.*, 195.  
9 *Hauer, op. cit.*, 22.
had considerable influence on Hauer's conceptions because of his extensive Oriental studies.\textsuperscript{10}

Hauer also designed a new notation, which is mentioned for the first time in \textit{Vom Wesen des Musikalischen}. He described it as a "notation desired for the writing down of our newest music; it has one individual sign (dot) for each tone of the temperament (\textit{c}, \textit{d}-flat, \textit{d}, etc.)."\textsuperscript{11} Based on lines and spaces which correspond to the keys on the piano, this new notation (or tablature) is described in greater detail in the third treatise, the \textit{Zwölftontech-
nik}. (Ex. 4) Opera 15 through 19 were published utilizing it. After the Opus 19, Hauer no longer printed his compositions in this way, but he did compose with it in order to perceive the so-called "melodic outline."

\textbf{Ex. 4. Hauer's Twelve-tone Notation.}

\begin{center}
\begin{tikzpicture}
\end{tikzpicture}
\end{center}

\textsuperscript{10}See pages 13-14 above.

\textsuperscript{11}Hauer, \textit{op. cit.}, 41.
In 1923 Hauer presented the "Twelve-tone Law" for the first time in the second edition of *Vom Wesen*. He termed his revolutionary concept the "Nomos of the atonal melody."

In atonal music there are no longer any tonics, dominants, subdominants, degrees of the scale, resolutions, consonances, dissonances, but only the twelve intervals of equal temperament; consequently, its "scale" originates out of the twelve tempered half-tones. The law of the atonal melody exists in that within a certain tone-row, no tones may be repeated and none left out (no tone receives physical predominance). All twelve tones of the temperament must be played.\(^{12}\)

Schoenberg's method of composition with twelve tones related only to each other, which holds to the same basic law, was published for the first time by his pupil, Erwin Stein, in the *Musikblättern des Anbruch* of 1924.\(^{13}\)

There are certain passages in *Vom Wesen* which point to Hauer as a "man before his time." Hauer foresaw the advent of electronic music at least thirty years prior to its appearance. At that time he was already searching for a "pure" tone, one without partials, which he sadly admitted was impossible on the instruments that were known to him.

In order to realize all 'pure' tone-colors, we need an instrument with an infinite number of tones.


\(^{13}\) Szmolyan, *op. cit.*, 26.
These must be constituted essentially without overtones, without noises, so that one really differs from the other only by pitch (thus analogous to the piano or harmonium, only infinitely more perfect). These tones must also have the feature that one could sustain them to any length. And now we return to this infinitely more complete ideal instrument with which one could completely realize into existence any music intuitively experienced.\textsuperscript{14}

In his book, \textit{Electronic Music}, Allen Strange discusses the production of the phenomenon that Hauer desired:

The most noncomplex type of sound is the sine wave. This particular wave shape ideally contains no overtones. The closest sound to a pure sine wave in a symphony orchestra is that of a flute. A sine wave exhibits the same basic pattern no matter what frequency or amplitude is required. . . . However, a good sine wave is very difficult to produce and the composer usually has to settle for something less.\textsuperscript{15}

In addition to sounds without overtones, Hauer also desired an instrument which could produce any number of intervals and even quarter tones. It would be impossible to mention here in detail all of the keyboard instruments throughout the ages which have been designed to accommodate the plurality of keys and intervals, beginning with the famous six-keyboard archicembalo of Nicola Vincentino in the sixteenth century to the obscure Ervin M. Wilson and his patented thirty-one-tone keyboard of the twentieth. Moreover, Hauer, as may be deduced from the following, perhaps had a presentiment of the advent of the synthesizer, or at

\textsuperscript{14}Hauer, \textit{op. cit.}, 18.

\textsuperscript{15}Allen Strange, \textit{Electronic Music} (Dubuque, 1972), 3.
least a similar device, capable of reproducing the sounds and timbres of the various orchestral instruments: "With all of the intervals, one can produce every tone-color, and naturally that of any orchestral instrument whatsoever."¹⁶

Vom Melos zur Pauke: Eine Einführung in die Zwölftonmusik

In his second treatise, Vom Melos zur Pauke, Hauer suggests philosophically that, while composing, there should occur a "lucky amalgamation" of the melodic with the rhythmic, the monodic with the harmonic, and the homophonic with the polyphonic. Nonetheless, he also recommends an occasionally longer recuperating stay at the "airy" pole of melody, to bring about purification and unity.¹⁷ Because of his concept of Goethe's Polarität¹⁸ in the Theory of Colors and his knowledge of the Chinese doctrine of polarity (Yin and Yang), Hauer distinguishes two contrasting poles, the tonal, rhythmical pole, and the a-tonal, melodic pole, "within which every conceivable music

¹⁶Hauer, op. cit., 18.

¹⁷J. M. Hauer, Vom Melos zur Pauke (Vienna, 1925), 10.

¹⁸The principle of polarity (Polarität) is, according to Goethe, one of the "two great driving wheels of all nature." Steigerung, or the question of how one may realize inborn potentialities, is its complement. See Thomas Clifton, "An Application of Goethe's Concept of Steigerung to the Morphology of Diminution," Journal of Music Theory, XIV (Spring, 1970, 169-172.
must move within the domain of the musical.\textsuperscript{19} The "purely tonal music" at the rhythmic pole originates while "drumming" on a tone. The "purely atonal, purely melodic pole" of music forms the contrast to it by:

perpetually playing or singing the twelve well-tempered tones monophonically, without accentuation, each tone equally long and equally loud. In the icy desert of either pole, no man can endure for long.\textsuperscript{20}

Therefore the composer must meet the listener half-way and reach a compromise by taking up a position between those two extreme poles. The characteristics of the polar relationships, tonal and atonal, are clearly compared by Hauer in a table of paired concepts which he has listed in \textit{Vom Wesen des Musikalischen}.\textsuperscript{21} (Ex. 5)

\begin{verbatim}
Ex. 5. J. M. Hauer. Table of Tonal and Atonal Relationships, Vom Wesen des Musikalischen, page 5.

<table>
<thead>
<tr>
<th></th>
<th>Tonal</th>
<th>Atonal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tone Interval</td>
<td>Noise Sound</td>
<td></td>
</tr>
<tr>
<td>Rhythm</td>
<td>Absolute pitch Relative pitch</td>
<td></td>
</tr>
<tr>
<td>Stressed tones</td>
<td>Equal-tempered</td>
<td></td>
</tr>
<tr>
<td>Tonal</td>
<td>Overtone spectrum</td>
<td>Tone-color totality</td>
</tr>
<tr>
<td>Violin, horn...</td>
<td>Piano, organ</td>
<td></td>
</tr>
<tr>
<td>Yodeling, shouting</td>
<td>Singing, speaking...</td>
<td></td>
</tr>
<tr>
<td>Rule, convention</td>
<td>Nomos</td>
<td></td>
</tr>
<tr>
<td>Stability</td>
<td>Motion</td>
<td></td>
</tr>
</tbody>
</table>
\end{verbatim}

\textsuperscript{19}Ibid.
\textsuperscript{20}Ibid.
\textsuperscript{21}Hauer, \textit{Vom Wesen des Musikalischen}, 5.
In the right-hand column above, two terms, "Melos" and "Nomos," are included, which form an essential part of the Hauerian theory. The Greek work, "Melos," was variously interpreted in the writings of the Classics and theorists of the Middle Ages at first as "language," then as "song," and later in the sense of our concept of "melody," vocal and instrumental. There is also a narrower concept of "Melos": the stress and stimulus of the melody or the dependent force within it--its kinetic energy. The music theorists of the Middle Ages occupied themselves less with the concept of "Melos" than with that of melody.  

In Hauer's case, the term "Melos" first appeared in his theoretical work, Deutung des Melos, of 1923. For him, "Melos" no longer signified a melodic element, but the melodic formation of a principle based upon the spiritual, which is characterized as primitive and invariable, as "essence" and consciousness, or as root, source, and fountain of all things. The adjectival form of "Melos" which Hauer

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22 Monika Lichtenfeld, Untersuchungen zur Theorie der Zwölftontechnik bei Josef Matthias Hauer (Regensburg, 1964), 49.  
23 Ibid.
employed in all of his writings is "melische." Another Greek term frequently found in Hauer's writings is "Nomos," which simply means "law." The oldest definition of the word is a "habitual practice" or "custom," and only later took on the meaning of "law." Occasionally the plural, "Nomoi," appears. Opera 1 and 2 of Hauer's musical compositions are titled "Nomos."

Throughout his first creative period, Hauer emphatically stated that his atonal music could only be performed on equal-tempered instruments such as the piano, harmonium, or organ. The human voice was also considered "suitable." In Vom Wesen des Musikalischen Hauer remarked that it is aesthetically objectionable to let a purely atonal melody become physically audible on an orchestral instrument. Once again in the twelve-tone games of the third creative period, there is the repeated ascetic restriction to the piano and harpsichord. Seldom are strings and isolated winds used. In the second period (circa 1924), however,

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24 In Berlin after the First World War "Melos" became the name of an association that was founded for the promotion of contemporary music. Beginning in 1920 it printed a journal for new music titled Melos; the editor of the first volume was Hermann Scherchen. Since Hauer's use of the word "Melos" postdates the origin of the society and its journal, it seems possible that Hauer was influenced in his adoption of it. He was often favorably mentioned in the early volumes; the first and third volumes both contain his compositions in their appendices.

Hauer wrote works for chamber music and orchestra, even including the despised "noise-instruments" /percussion/. In *Vom Melos* we find:

There is no purely atonal music, since it would be monophonic and without rhythm. However, both rhythm and Melos belong to an actual, concrete melody, out of which harmony and polyphony again result entirely from themselves. Therefore, one could also use "tonal" instruments /Including tympani/, assuming that they are tempered and tuned as well as possible.

The very title of the treatise, *Vom Melos zur Pauke*, literally translated, "From the melody to the tympani," or, more figuratively, "From melody to rhythm," indicates Hauer's change of musical taste. At the conclusion of the essay, he admits to having scored tympani into his compositions, primarily because they were "tunable," but even during this second period of composition he preferred the "melodic pole" over that of the "rhythmic."

Concerning theoretical matters, there are four styles of textural construction discussed in *Vom Melos zur Pauke*:

1. Simple twelve-note melody with homophonic accompaniment
2. Sustained notes, suggesting a first step toward counterpoint
3. Polyphonic style
4. Static tropes (divided into vertical planes)

In the first style, a trope is used for the melody with an accompaniment selected from the same trope. Hauer placed

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26 Hauer, *Vom Melos zur Pauke*, 22.
the tones of each half of the trope vertically under each other, thereby forming six-tone chords. Due to a lack of special nomenclature for these chords, he designated them according to the tropes. For example, the "chord of the fifth trope." The chords could be inverted, but the transpositions into the various positions changed nothing of the nature of the chords (Ex. 6).


Hauer claimed that this homophonic style was even adaptable to programmatic effects, and he gave the illustration of a "rain-shower" and a "bird-song" to prove it (Ex. 7).
In the second style, sustaining the notes of the trope produces the first step toward a polyphonic texture. The notes still appear in succession, each at its own point of time (Ex. 8).

The third method is true polyphony, or, as Hauer calls it, "hohe" or high polyphony. In this style each voice may continue throughout in canon or in stretto (Ex. 9).

Ex. 9. J. M. Hauer, Vom Melos zur Pauke, pages 17 and 18.

The third style blends into the fourth, the so-called "static" use of the tropes. Although all twelve tones are used, some notes are held over from one statement of the trope into the next. A complicated development of this fourth style is called "obstinate" counterpoint, not because of ostinato treatment, but because the voices are
independently minded. According to Eschman, this style is generally difficult to distinguish from that of the Schoenbergian "series" (Ex. 10).\textsuperscript{27}


\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{music_example}
\caption{Zwölftontechnik: Die Lehre von den Tropen}
\end{figure}

The \textit{Zwölftontechnik}, written in 1925 in collaboration with Hermann Heiss, was originally published by Schlesinger, but a year later it appeared in the Universal Edition. It describes Hauer's polyphonic compositional techniques. Hauer's twelve-tone system is based upon forty-four "modal"

\textsuperscript{27}K. H. Eschman, \textit{Changing Forms in Modern Music} (Boston: 1945), 87-92.
or "scalar" forms (tropes). These tropes are the source of his harmony, polyphony, and melody. Hauer once stated that after he had discovered the tropes, he used them in place of the traditional "keys." Each of these tropes is divided into two constellations of six notes each. In this way eighty-eight hexachords, or constellations, are derived.

The sum of all possible tropes out of the twelve tones is the result of the multiplication of its members:

\[ 1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9 \times 10 \times 11 \times 12 = 479,001,600 \]

This number includes not only the complete rows of different tone-successions, but also their transpositions. According to Hauer tropes 1, 8, 17, 19, 24, 34, 41, and 44 have equivalent halves; that is, each side contains the same interval relationships. These are called the symmetrical \( \text{widergleich} \) tropes.

Ex. 11. The Symmetrical Tropes.
Since in each of these eight tropes, the second hexachord can be derived by some transposition of the first hexachord, the total number of distinct untransposed hexachords is reduced to eighty. In order to ascertain whether this is the correct number of hexachords, multiply eight, the number of distinct hexachords by twelve, the number of possible transpositions. This results in a total of 960 transposed hexachords. A formula\textsuperscript{28} for finding the number of combinations of "n" things taken "r" at a time is

\[
\frac{n!}{r!(n-r)!}
\]

Thus,

\[
\frac{12!}{6!(12-6)!} = 924
\]

Upon subtracting 924 from 960, there is a difference of thirty-six hexachords that are unaccounted for. However, when transposed to each degree of the chromatic scale, tropes 8, 34, and 44 each produce respectively 6, 8, and 10 duplications of hexachordal content. The second hexachord of each trope is a transposition of the first hexachord in each of these particular cases. Thus the thirty-six extra hexachords are accounted for, and the number of combinations of twelve sets taken six at a time.\textsuperscript{29}


\textsuperscript{29}Ibid.
Since order within each hexachord is not stipulated, Hauer indicates that there are six possible note orders within each trope half, or 720 permutations. Furthermore, variation may occur by presenting the second hexachord of a particular trope before the first. Each trope may also be transposed to any level, and any number of tropes may be used within a composition.

Hauer presents the tropes in tables to expose the half-step characteristics within each trope-half by rearranging the notes of the hexachords so that all half-step relationships are maintained consecutively and all other intervals are arranged vertically, thus resulting in a distinct "trope picture."


---

30 On page 87 of his Changing Forms in Modern Music, Eschman states that the notes of the tropes may be in any order, provided that they remain in their trope-half. One might think of them as "sheep" playing in two fields; as long as they do not jump the fence, the two flocks keep their identity. However, they do sometimes actually "jump the fence" in the music.

31 Lewin, op. cit., 143.
Each twelve-tone melody can generate other tropes called "phases," which arise from successive rotations of a melody.

In certain melodic constellations, it can happen that two or more phases can remain in the same trope (that is, two or more rotations may generate the same trope form) but each twelve-tone melody moves (with its phases) at the most within six tropes.


As a means of insuring a variety of pitch content between consecutive non-complementary (not belonging to the same trope) hexachords, untransposed consecutive phases may be used. In this way the pitch content of the last hexachord in any trope will differ from the pitch content in the first hexachord of its next untransposed phase by five pitches. This, of course, is the maximum number of possible pitch differences, since two hexachords are complementary if they differ by six pitches.

\[32\] J. M. Hauer, Zwölftontechnik, Die Lehre von den Tropen (Vienna, 1926), 5.

\[33\] Lewin, op. cit., 147.
The following example from page eleven of the *Zwölftontechnik* contains a three-voice canon constructed out of trope 31. In order to construct the three-voice canon in this example, Hauer divides each hexachord into segments of $3 + 2 + 1$, and maintains the half-step characteristics of each trope within the canon.


In the example on page twenty of the *Zwölftontechnik*, the half-step characteristics of the trope are ignored, and consequently the lines are more angular. Each trope-half is presented as a basic thread from which the other voices are synthetically derived and the consecutive tropes are not consecutive phases. (Ex. 15)

---

34 That is, in a free manner.
In the final illustration on page twenty-one the twelve-tone thread skips from voice to voice, and the other voices are again derived synthetically.

Although the use of inversion or retrograde-inversion is occasionally found in Hauer's music, these devices are ordinarily not feasible in the trope-system, since the application of either of these devices will cause certain tropes to resemble one another; such configurations relate directly to one of the forty-four source hexachords. Hence it can be said that those source hexachords which can be combinatorially treated are subject to inversion and the like.\footnote{Ibid., 150. See also Chapter II, page 30.}

In what way do the tropes influence or produce form? When a trope appears in one voice, and its two halves are indicated by some important rhythmical division such as a measure, half-measure, and so forth, then these halves create a symmetrical structure.\footnote{Eschman, op. cit., 98.} If the order of the notes in a trope is retained, as in a passacaglia theme, that too, has constructive force. If the distinction between the two halves of the trope is abandoned, and at the same time, the repetition of an established order is disregarded, then the tropes have no differentiation in their materials. In this case, one "atonal trope" would include all possibilities—a phenomenon that occurs frequently in Hauer's writings.\footnote{Ibid., 103.}

Hauer published the original numbering of the tropes in the *Zwölftontechnik*, so that the specifications of the trope...
tables of 1925 are valid only for the works composed before 1948. In his later years Hauer renumbered the tropes in order to place them in a symmetrical arrangement. The new numbering of the trope-table of 1948 is used primarily for the twelve-tone games. (See the following tables on pages 73 and 74.)

In addition to note representation Hauer devised a geometric pattern to represent an arrangement of the tropes. (Hauer's geometric and morphological arrangement of all of the forty-four tropes may be found in Appendix II, pages 271-274.) The pattern consists of a circle divided into twelve parts; each part represents a chromatic half step beginning with the letter "a" and rotates clockwise. Using this pattern he derived geometric designs by drawing straight lines between various notes of the trope. Example 17 shows the first trope in its musical form as well as its geometric representation.

Ex. 17a. Trope 1.

\[\text{Diagram of Trope 1}\]
Ex. 17b. Geometric Representation of the First Trope.

A comparison of the shapes or designs created by each half of the trope led to a classification scheme devised by Hauer which classified these morphological representations in terms of their sameness of shape and the parallelism created between the vertical lines. Example 18 shows a simplified graphic representation of the main aspects, shape, and parallelisms of the first trope. Here it will be noted that the shapes are both similar and parallel.

Ex. 18. Simplified Graphic Representation of the First Trope.

---

38 After Szymolyan, *op. cit.*, 57.
Hauer said that tropes of this category were polysymmetrical and included in this group the tropes numbered 1, 4, 10, 28, 29, 39, 41, and 44. The second group of tropes—those said to be monosymmetrical (numbers 2, 3, 9, 11, 12, 13, 26, 27, 30, 34, and 43)—have patterns that are symmetrical but create no parallel lines within the circle. Example 19 shows a monosymmetrical trope with its musical, geometric, and simplified representations.

Ex. 19a. Trope 2.

Ex. 19b. Monosymmetrical Geometric Representation of the Second Trope.
Ex. 19c. Simplified Graphic Representation of the Second Trope.

A third group has dissimilar hexachords and is classified only through the parallel lines that exist in one or both hexachords and occasionally between them. (Ex. 20a, 20b, 20c.) These are called endosymmetrical tropes and include the tropes numbered 7, 8, 14, 32, 35, 36, and 40.

Ex. 20a. Trope 7.

Ex. 20b. Endosymmetrical Geometric Representation of the Seventh Trope.
Ex. 20c. Simplified Graphic Representation of the Seventh Trope.

The morphological arrangement of the fourth group, the exosymmetrical, creates neither parallel forms nor lines in their graphic representation. (Ex. 21.) Tropes numbered 5, 6, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25, 31, 33, 37, and 38 are exosymmetrical.

Ex. 21a. Trope 5.

Ex. 21b. Exosymmetrical Geometric Representation of the Fifth Trope.
Ex. 21c. Simplified Graphic Representation of the Fifth Trope

Hauer made no particular use of these graphic representations but felt that they aided the user in assimilating the rationality of the system and gave visual as well as audible form to his music.
TABLE I
HAUER'S TROPE TABLE OF 1925 IN HIS
TWELVE-TONE NOTATION
TABLE II

HAUER'S TROPE TABLE OF 1948 IN HIS TWELVE-TONE NOTATION

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OF THE 1925 TABLE AND THOSE OF 1948

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CHAPTER IV

VOM WESEN DES MUSIKALISCHEN:
GRUNDLAGEN DER ZWÖLFTONMUSIK

THE NATURE OF THE MUSICAL

Fundamentals of Twelve-tone Music
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In our conception of music we orient ourselves by means of two things: by melody, as it is given spiritually to a musical man, and by tone (color), as it is produced by some physical instrument. Between tone and melody, a reciprocal action of enormous power and conformity persists within a human being. This mutual effect manifests itself in two directions. For example, a man wants to express a musical process as such (communicating it to someone), so he chooses certain tone sequences. On the other hand, another man hears these tone sequences; in this way, the same or a similar musical process is evoked.

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<td>Singing, speaking</td>
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<td>Rule, convention</td>
<td>Law, Nomos</td>
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<td>Stability</td>
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**TONE, SOUND**

That which we call a "tone" in music is in reality a complete chord, a sound. We know from physics that every tone produced by a musical instrument includes a row of overtones. Helmholtz has called our attention to these
aliquot tones, which are in fixed interval ratios to their fundamental. (See Diagram B in the appendix.) Taking a bell as an example we can easily differentiate some of the more prominent overtones with the unaided ear.

The tone (element, simplex, abstraction) is perceived through abstract (unmusical) listening, through the analysis of the listening experience; the sound (complex, a multiplicity of tonal elements functioning as a unit) is perceived through concrete (musical) listening. Sound is the synthesis of the multiplicity in the sense of hearing. (The senses are spirit!) Thus the tone heard abstractly is an element; concretely heard and experienced is a sound, a chord—namely, a tone with the accompanying sounding overtones. Melody may be the development of the physical body of a sound, the development of a chord in time. In order to hear a noise as sound or tone, and not in and of itself, we appraise it musically, aesthetically. That is, our appraisal is not based on its physical exactitude (number of vibrations), but on the natural occurrence of hearing underlying the force of "spirituality."

OVERTONE ROW, NOISES

The timbre of an instrumental tone depends on the character of its harmonic series (greater prominence of one partial, quantity and height of the partials). Every sound has a "sound"—color in so far as it implies a "chord" (complex of
sound elements—the tone with its overtones—spiritual-physical synthesis of a diversity.) The fact that it implies a chord gives it its color. Tone-color is also a presentiment of a melody (namely, a melody is proportionate: a temporal development of the multiplicity in the sound.)

Noises play a great role in the sound of all instruments (for example, bowing, blowing, plucking, among other things); yes, noises even predominate among some instruments (drums). In the narrowest sense, timbre (of the trumpet, violin, etc.) is brought about by the fixed character of the harmonic series and through noises.

Produced physically on some instrument, each tone has two principal characteristics: one that is purely physical, noise, and one—the overtone chord—which is challenging, provoking to the musical estimation. If we consider our ear (as well as the eye) as an organically modified sense-organ, noise (harsh, rattling, strident, hollow, nasal, bawling, cackling, bellowing, and a whole succession of other noise designations) corresponds to the "feeling." In reality only noises may exist to a totally unmusical person, for he probably perceived the overtone chord as such; thus the unmusical nature prefers noises. Consequently, the "musical" part of timbre, the overtone chord, is ignored by most people to the extent that they
label the noises as merely "tone-colors." They search for the nature of tone-color in the physical body of the instrument, while even that itself is limited in the spirituality of its origin by the tone-color—that is, by that timbre which the freely-creative musical imagination produces. This is in no way dependent on the sound-experience, which originates from the instrument. In the spirituality of its origin, this tone-color caused men to create the resonating body first. It motivated them in their "inner" being, which had the need to let the intuitively experienced tone-color become physically audible and to search for a certain resonating body which the musical experience (beyond the sphere of intuition) in the realm of the physical experience should have made possible. A complete realization of the musical intuition of tone-color within the realm of the physical experience is perhaps impossible; that is, the timbre of the instrument will always dim that timbre which is produced by the intuition.

Whoever built the first resonating body must have quite forgotten every original musical experience which he must have had. The great violin builders, for example, discovered a violin-form out of which through their genius they created each violin. They repressed the "noises" and brought to its most unclouded purity the overtone chord characteristic of this instrument, which conforms to the more highly developed aesthetic requirements. Each violin sets up the
instrumental hypothesis of the violin melodies of Mozart—and indeed, Mozart has perhaps actually composed "in" the essential violin melodies. In spite of the most accurate measurement, the violin can no longer be imitated in quality, since none of the new violin builders is inspired with the restoration of his instrument, whose specific tone-color was divined by intuition and the spirit. This may be the case not only with the violin, but also with other musical instruments under artistic consideration. One could compare the noises which never entirely escape during the playing of each instrument with the material upon which a color becomes visible.

THE MUSICAL IN MANKIND: MELODY

The musical ear has a spiritual (aesthetic) need for "pure sound" (not the same as a pure tone!) The resonating body offers the possibility of realizing the "ideal" hearing (the hearing of pure sounds in music-creating—corresponding to a "spiritual" hearing need), that is, of making it physically audible. Within it the battle of pure sound takes place with the resistance of matter" (noises). The great multiplicity of sounds in the musical artwork is a "psychical" condition arising out of "inner life" (not external experience).
The musical in men is not a single sound or tone, but melody (or yet, at least the nucleus of it, the "Melos") which originates in a "creative" act. It can originate in two kinds of ways: intuitively and in conformity with creativity. The intuitive way originates entirely out of the inspiration, being based on the hearing process from within while subjectively anticipating the sound-experience in its objectivity—essentially creative and productive. Creative conformity is dependent on objective sound-experience which afterwards produces the musical hearing of a piece of music (also the hearing of a single tone with its overtone chord.) Any one chord physically generated has to signify something aesthetic first if it is heard intuitively by the "musical" man, that is, in melodies transformed and composed by him. At the same time this is also the process through which such a chord becomes tone-color; thereby the musician sets up some subjectives (musical ones). Inwardly he decides on the color, just as it is described in Goethe's *Theory of Colors*; the origin of color and deciding what color it is are one and the same. Most people, however, merely distinguish the colors, (that is, the colors in and of themselves) without saying anything at all about their spiritual, aesthetic content. They cannot comprehend and interpret the "Melos."
INTERVAL: THE NATURE OF TONE COLOR

If we perceive noises as more or less disturbing accompanying phenomena \([\text{to tone}]\), then we have already expanded the concept, "tone-color." Therefore the substance of tone-color is based on the characteristic structure of a chord. We place two guiding principles in opposition: first, the essential factor of each tone-color is a specific chord; and second, each chord contains a specific tone-color. For example, if we strike the contra-C strongly on the piano while simultaneously striking the one-line d, g-sharp, and a, somewhat weaker, then we will have the impression (sensation) of a bell-tone (for example, the town-hall clock of Vienna). The ninth and thirteenth partials stand out more strongly in the row:

\[
\begin{array}{ccccccccccccccc}
C^1 & C & G & c & e & g & b-flat & c^1 & d^1 & e^1 & f^1 & g^1 & a^1 & b-flat^1 & b^1 & c^1 \\
1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & 11 & 12 & 13 & 14 & 15 & 16
\end{array}
\]

(The thirteenth partial lies between tempered g-sharp\(^1\) and tempered a\(^1\), so we must strike both tones on the piano. See Diagram B.) From the special piano sound we perceive that the essence of the above-mentioned tone-color lies in the triad c--d--(g-sharp)a.

We can, however, go another step further. Continuing with the above experiment of the bell, the (g-sharp)-a is the highest of the prominent overtones. Out of musical experience we know of the crucial significance which belongs
to both corner tones in a chord, and moreover, when its intervals always remain the same, as is the case with the overtone row. The simulation of the bell tone on the piano will still succeed then, even if we strike only two tones the contra-C and the one-line a.]

In every overtone row one overtone is the most predominant. At the same time it forms the upward limit. Its interval ratio with the fundamental determines the musical character of the tone-color. The quintessence of any timbre is therefore determined by means of two tones (an interval, the simplest chord) and its interval ratio.

The essence of each timbre is heard in the interval which is formed from the fundamental tone and from the highest of the prominent overtones of a row. Each interval contains the nucleus of a tone-color. The interval gives the color effect to the music. Interval=color.

Thus, the overtone chord with its variants (which in and of itself can be designated in a certain sense as noise) leads us to the "music" of the individual resonating bodies (instruments), and which we, on the other hand, through musical, creative hearing give a musical sense. Through the interval proportions of the harmonic chord and through the "musicality" of the listener (that is, tone-color and melody-creativity, in which the "spiritual" meaning is included in the interval) even the harmonic chord becomes
tone-color, pure melody, freed from the body, from materialism, from matter, from noise.

Many of you are probably saying by now, since the harmonic chord is always the same, (1:2:3:4:5, and so on) in what way can it imply various colors? Indeed, the harmonic chord resembles major in its various positions by the stronger production of certain partials among the various timbres. We speak, for example, of the position of the fifth of a chord, thinking thereby of the corner tones, which now play a great role directly in the one overtone chord which is formed. The fifth, however, is the name of an interval, and this leads us directly to that which is musical, to the melody, to the color, which results. Thus we inwardly "decide" that the physical distance of two tones from each other (vibration ratio), or the interval, receives a "musical" sense. The character of the tone-color certainly lies in the interval. This "decision" of the color, by which it is given only as an aesthetic value, is in reality nothing other than the indescribable "act of making (something) aesthetic" in the hearing process.

If that be the case, then the specific timbre of an instrument must also be heard on the piano, obviously free of "noises," and therefore, in its spiritual purity. The hammers of the piano must strike out the technical foundations at various positions on the strings (in the seventh
to thirteenth partials). Thereby various overtones stand out stronger and produce every conceivable special timbre. At the first impression, this phenomenon is a defect; it also causes difficulty for the tuner while tuning the tones (especially with the blending). Since the individual timbres of the strings occur in exactly the right places, this absolute "temperament" can also be utilized advantageously, aesthetically (for example, after striking the ninth partial, the eighth stands out and thereby produces the violin tone directly in the position between the one-line a and the two-line a). Up to a certain point that can be shown "physically." See the oscillations of the strings illustrated by the diagram.

The straight line $\overline{AB}$ is the string in the rest position which is struck by the hammer at C ($\overline{AC}=1/9 \overline{AB}$), and is in the fundamental oscillation, which the fundamental tone gives. It falls into additional undulating oscillations which permit the major second to bring out the eighth partial and which, like the flute-like tones, originate similarly through the node formation brought about by the impact of the hammer. Naturally, only the "musical" ear
can conceive the tone-color in its creative intuitiveness. It comprehends intuitively by listening to the tone of the violin (not produced on the piano) in its musical "noise-free" characteristic, not from the instrument in its objective physical actuality (in which the disturbing factor of noise is imparted again and again), but presents it and its color creatively. Only that musical ear will actually hear the "violin tone" from out of the piano tone. There are two different kinds of "ears": ears which run before the "reality" (of the experience), and those which run after it.

If I sing the interval of the major second, then I have sung the most inherent melody of the violin, the melody nucleus based on variety. With this in mind, as Goethe says, one is "pathologically affected" to a certain degree with the contemplation of the individual color; thus in our case, imagine the interval, its character, its original rhythm, its melody, in the fluid, easy swing of its nature; for example:

\[\text{Music notation image}\]
If we now introduce the harmonic series of an open string on the violin, then we have an idea of the melody of the "Queen of the Instruments":

Like a pendulum, each tone of the violin is subject to these oscillation proportions. Therefore G, D, A, E Major and Minor, which correspond to the open strings, are genuine violin keys since they resemble the natural ratios of the instrument. As they take into consideration the violin melody in and of itself, they do not disturb the oscillations through intervals foreign to the violin, and thus meet "half-way" the "music" of the violin. However, they do not force noise possibilities out of it which many characterize as "unusual timbres." This discussion of the "violin melody" infers that only a single melody might lie in this instrument; perhaps this is actually the case. The greatest composers, however, have already composed the principal violin melodies--Mozart, for example (see the D Major passage in the well-known C Minor Phantasie for piano by Mozart.) They have done nothing other than force out and
realize creative "developmental possibilities" reposing simply in this violin melody. These developmental possibilities are, however, undoubtedly limited, and the time had to come, therefore, in the course of music history in which they all were, as it were, absolutely drawn out and exhausted. At this moment the "assault" on the violin begins; that is, composers begin to force its melodies, which are foreign to its characteristic tone-color. The correlation is the same as when one, who has originally conceived a formative idea in marble, carries it out in wood.

The "spirit" of an instrument lies in a specific interval. If we strike a perfect fifth in the middle range of the piano, for example, then we will call trumpets to mind. Indeed, the mere conception of the fifth suffices enough already. The character of this interval and melody, with its innate rhythm, appears as follows (with the trumpet-like character growing out of it somehow):

\[ \text{(Perhaps the second overtone, the fifth, comes out more strongly in the trumpet.)} \]
trumpet as well as the reverse; we also give a melody with certain characteristics to the trumpet. In any case, the trumpet melody was prior to the trumpet. Perhaps a "soldier" searched a long time until he found that pipe out of which trumpet tones, fanfares, were produced.

It is really all the same as to which interval an instrument is linked according to its character. We must not think of this or that instrument (of the material, the "noise") in connection with a melody, or in connection with this or that interval, but the interval itself makes a purely musical or "color" impression on us. The interval is already a certain tone-color with its marked musical character in the pure imagination.

Goethe, in his Theory of Colors wrote:

Since color maintains such a high position within the order of the primitive appearances of nature, because it completely supplies its modestly appointed sphere with decided variety, then we should not be astonished to discover that it produces a decided and important effect through the perception of the eye, to which it is above all suited, and through its providing for the soul, in its most universally fundamental manifestations, without relation to nature or form of a material. We perceive the surface area of this material, alone a specific operation, in a classification partly harmonic, partly characteristic, also often unharmonic; always however, a decided and important operation, which conforms directly to the ethical. Therefore then, color, viewed as an element of art, can be used to work for the highest aesthetic purposes.
THE MUSICAL FANTASY

We have already gone into the area of the musical psyche, the imagination, the fantasy. Nevertheless, reality continues in its fixed, narrowly enclosed compass. (Reality is the resonating-body, the instrument, the refractory material.) We must, however, press forward to the "idea" of the "tone-color" in order to gain aesthetic stability. Through the interval we can survey the entirety of the musical color-world; we can classify the isolated phenomena in the sphere, and separate the accidental from the essential, the simple from the complex. Without the fine sense for intervals and rhythms, which resides in our psyche, all music falls apart into chaos (a din). Music is the transposition of the innermost emotions into intervals and rhythmic manifestations. Ideally the musical fantasy has to do it with "pure sounds" (with sounds and their colors, unconcerned with the "resistance of matter") whose realization it seeks in the resonating-body. (Always an approximate realization only!)

Is the musical fantasy stimulated by the tone-colors of the resonating-body? No. It creates these timbres by itself. It searches for the resonating-body out of the need to allow it to become "physically" audible (for the realization of the "ideal" sound). At first the resonating-body itself was created with the help of this musical
fantasy. Nature had not placed it at man's disposal; at best it met him part of the way. The musical "tone-color-creative" fantasy is necessary not only to musical creating, but also to musical hearing--because the "realization" of the "ideal" sound in the resonating-body is never complete. Only that man is musical who is endowed with a musical imagination which is called "tone-color-creative" fantasy. Aesthetic satisfaction of the hearing depends on the fact that man hears what his musical imagination desires to hear (this holds true for all aesthetics).

Goethe, concerning the eye, wrote:

Colors, which we perceive in the body and which at first became almost stamped on this perception, are not something completely foreign to the eye. No, this organ is always of the disposition to produce colors itself and enjoys a pleasant sensation when something is conveyed to it from without according to its own nature, and when its precision is significantly determined according to a certain aspect.

There is also music-creating, whose musical fantasy (since it is secretly uncreative) is suggested and stimulated by the tone-colors of the resonating-body. The "mechanic"--"music-engineers"--"exotic-music" men create a music which pushes towards the noise of matter (instead of wishing to overcome this noise); the materialism in music--materialistic music--can also "inspire" exotic-music men (Wagnerian). Joy at the edge of chaos--joy on the verge of noise--even Beethoven has made a considerable uproar several times (the Fifth Symphony; Ninth, finale!!!).
The "rebirth" of music: a return to the musically original experience in its spirituality. This spirituality, however, is not to be sought in artificial spheres, in the domain of the idea!

While the musical theory of color makes sense, it also makes the original musical meaning of the interval evident, and with it, the sense and significance of the melody.

**INTERVAL AND RHYTHM: MANIFESTATION**

Not only does the essence of the tone-color (the melody) lie in the interval, but also in that of the rhythm.

As soon as we sing an interval, sing its melody, we make a "musical" manifestation. This manifests itself in a definite rhythm, and makes the "sense" of the color, of the interval, obvious to us again. Conversely: the melody (as it originates in us creatively) with its rhythm (expression) unfolds itself in the interval and in further succession in the tone-color of the resonating-body. Not only is the interval a "melody," a "music;" it is also something physically measurable at the same time. Everything purely musical lies in the interval, everything. And the essential factor of the interval lies precisely therein, that an unknown something, which becomes apparent in the composed melody, but in the long run does not become "well-known" and "comprehensible," moves from one tone to another.
For example, it may move from C to D, or from F to C, but not so that two individual tones sound successively or at the same time, except for a given sound that has no connection to a further tone. In short, the essence of the interval is movement. The interval is a manifestation. Each manifestation has meaning; in order that movement have meaning it must be a manifestation. The significance of a movement lies in the spiritual. The interval is a spiritual movement (movement of the spirit); for that reason it signifies something in and of itself.

The tone is in the interval—the sound of nothing moved but the movement itself. For the physicist, the movement is matter moved in a sound. (Oscillation theory.)

In addition, the symbolic and allegorical use of colors might be alluded to here. The cry of "fire!" , for example, is an allegorical use of the fourth; similarly, one uses certain colors as insignia, signals, and so on. The inciting of the fire-cry does not come from the fourth, but out of it, so that we are reminded by its tones that something is burning (perhaps in our immediate surroundings) or that otherwise a misfortune has occurred. It is also produced by the trumpet, an obtrusively fifth-colored instrument. The fourth, however, according to its musical nature, is a rest-compelling, cadence-producing interval, and has likewise been used (symbolically) for ages in any
genuine music. The Wagnerian leitmotiv is an allegorical combination of tones and chords analogous to the colors of flags.

The interval has a musical "sense." In this "sense" lies something infinite: if it is perishable, then a purpose comes into existence from it. The fourth of the fire-cry has a purpose over which it has forfeited the musical sense of the interval.

Goethe, on the use of colors, wrote:

It has been pointed out above in detail that every color makes a special impression on men, and in doing so, reveals its nature not only to the eye, but also to the mind. Hence it follows that color permits itself to be used for certain sensual, moral and aesthetic purposes.

One could term such a use symbolic, which may agree completely with nature, since the color was used according to its effect, and the true relation immediately expresses the significance. Another use is closely allied with this which one could term allegorical.

Finally, the fact that color also permits a mystical interpretation may indeed be suspected. For since that scheme in which the multiplicity of colors may be displayed indicates such primitive conditions which belong not only to the human perception, but also to nature, there is indeed no doubt that it could serve almost as a language to its relations, when one wants to express primitive conditions which are not so powerfully and diversely deposited into the mind.

Consequently, the musical theory of colors (tone-color theory) dissolves completely into the theory of the intervals.
DESCRIPTION OF THE INTERVALS

Concerning the perfect intervals, we are acquainted with the oscillation ratio of the octave: 1:2, the fifth: 2:3, and the fourth: 3:4. With these perfect intervals an entire system of only perfect intervals ("mathematical tuning") may be erected. If we take as a starting point C, corresponding to our notation (C Major without signature), and fix its number of vibrations as 1, then we obtain the relative pitches of the circle of fifths, while we calculate, continuing forward according to the row:

The circle of fifths:

\[
c : g = 2 : 3 = 1 : x \quad \quad x = \frac{3}{2} \quad g = \frac{3}{2}
\]

\[
g : d = 2 : 3 = \frac{3}{2} : x \quad \quad x = \frac{9}{4} \quad d = \frac{9}{4} \quad \text{and so on.}
\]

1, 3, 9, 27, 81, 243, 729, 2187, 6561, 19683, 59049, 177147, 531441,

\[
c \quad g \quad d \quad a \quad e \quad b \quad f^\# \quad c^\# \quad g^\# \quad d^\# \quad a^\# \quad e^\# \quad b^\#
\]

The circle of fourths:

\[
c : f = 3 : 4 = 1 : x \quad \quad x = \frac{4}{3} \quad f = \frac{4}{3}
\]

\[
f : b = 3 : 4 = \frac{4}{3} : x \quad \quad x = \frac{16}{9} \quad b = \frac{16}{9} \quad \text{and so on.}
\]

1, 4, 16, 64, 256, 1024, 4096, 16384, 65536,

\[
c \quad f \quad b \quad e \quad a \quad d \quad g \quad c \quad f
\]

\[
262144, \quad 1048576, \quad 4194304, \quad 16777216
\]

\[
19683, \quad 59049, \quad 177147, \quad 531441
\]

These extracted oscillation ratios extend over seven octaves in the case of the fifth, and over five octaves in the case...
of the fourth. In order to get all of the intervals into
the space of an octave, we correspondingly divide by 2, 4,
8, 16. . . (Fundamental tone to the octave, 1:2!)
The relative pitches in chromatic succession:

$$\begin{array}{ccccccc}
1, & 2187, & 9, & 19683, & 81, & 177147, & 729, \\
2048 & 8 & 16384 & 64 & 131072 & 512 \\
c & c# & d & d# & e & e# & f# \\
3, & 6561, & 27, & 59049, & 243, & 531441 \\
2 & 4096 & 16 & 32768 & 128 & 262144 \\
g & g# & a & a# & b & b# \\
1, & 256, & 65536, & 32, & 8192, & 4, & 1024, & 262144, \\
243 & 59049 & 27 & 6561 & 3 & 729 & 177147 \\
c & d_b & e_b & e_b & f_b & f & g_b & a_b \\
128, & 32768, & 16, & 4096, & 1048576 \\
81 & 19683 & 9 & 2187 & 531441 \\
ab & b_b & b_b & cb & db_b \\
16 Reduced in decimals to six places:

\begin{array}{ccc}
c & 1 \\
c# & 1.067871 \\
d & 1.125 \\
d# & 1.201354 \\
e & 1.265625 \\
e# & 1.351324 \\
f & 1.423828 \\
g & 1.5 \\
g# & 1.601806 \\
a & 1.6875 \\
a# & 1.802032 \\
b & 1.898437 \\
b# & 2.027286 \\
\end{array}

\begin{array}{ccc}
c & 1 \\
c# & 1.059463 \\
d & 1.122462 \\
d# & 1.189207 \\
e & 1.259921 \\
e# & 1.334838 \\
f & 1.414213 \\
g & 1.498306 \\
g# & 1.587399 \\
a & 1.681792 \\
a# & 1.781795 \\
b & 1.887744 \\
b# & 2.073080 \\
d & 1.973080 \\
\end{array}

In Diagram B we have taken a section as 1, and produced
these large-scale ratios with a coordination system. We see
a curve with various indentations. We imagine the dotted
line as the ideal pattern (as a symmetrically bent curve
leading from C to c), so we soon perceive from out of this inaccurate construction that the angles of indentation are removed further from the dots on all sides; in any case, their interval ratio appears more distant to the c than we imagine.

We also find the dots by calculating specifically. (We call the point being sought between F-sharp and G-flat in the following equation simply "F-sharp;")

\[
c : f# = f# : c \text{ (octave)} \quad x^2 = 2
\]

\[
1 : x = x : 2 \quad x = \sqrt{2} = 1.414213
\]

The dotted line moves about in a geometric row (see the numbers in the square above).

In the row sequence the point of the circle of fifths deviates proportionately from the dotted line upward in the row sequence: g, d, a, e, b, f-sharp, c-sharp, a-sharp, e-sharp, b-sharp; that of the circle of fourths according to the following: f, b-flat, e-flat, a-flat, d-flat, g-flat, c-flat, f-flat, b-double-flat, e-double-flat, a-double-flat, d-double-flat.

In order to form the large-scale ratios clearly, we draw the dotted line as a straight line and as a circle, while increasing the distances of the fifth and fourth points from it. Instead of increasing the distances upward, we take equal distances. See Diagrams A and C.
Above all, one must consider the agreement between the signature of the keys (G Major, one sharp; D Major, two sharps... F Major, one flat...) and the number of decimal points.

The dotted line represents the temperament pattern.

Also, in order to learn to recognize the harmonic series (the partials) more precisely, we again take our point of departure from C, and fix its vibration number at 1. Compare Diagram B.

1:2=c:c (pure octave)
2:3=c:g (pure fifth)
3:4=g:c (pure fourth)
4:5=c:x; x = $\frac{5}{4}$ = 1.25 (coming close to the pure f-sharp)
4:6=2:3=c:g (pure fifth)
4:7=c:x; x = $\frac{7}{4}$ = 1.75 (flatter than the pure b-flat)
4:8=1:2=c:c (pure octave)
8:9=c:d= ("pure" major second)
8:10=4:5 (see above)
8:11=c:x; x = $\frac{11}{8}$ = 1.375 (sharper than the pure e-sharp)
8:12=2:3=c:g (pure fifth)
8:13=c:x; x = $\frac{13}{8}$ = 1.625 (flatter than the pure b-double-flat)
8:14=4:7 (see above)
8:15=c:x; x = $\frac{15}{8}$ = 1.875 (coming close to the pure c-flat)
8:16=1:2=c:c (pure octave) and so on.
MAJOR AND MINOR

The harmonic series is the natural color spectrum out of which the diatonic major scale arose.

The "natural" melody is the scale. Each tone carries in its harmonic series a scale in itself. Each tone also has a scale from its relation to C (ratio of the partials to their fundamental tone)—Greek tonal genera. The "sounding" of a tone summons the scale—the melody. Melody: synthesis of a multiplicity. The "timeless" inner life wants to unfold itself in time. To that end, however, it needs space, namely the resonating-body existing in space.

Major triads and scales are natural phenomena. Their exclusive use implies the natural state of music (natural imitation). Contrary to major, minor is already a degree of spiritualization. The highest point of spiritualization in music is attained in the uniform use of the entire interval-(timbre)-circle.

The mathematical just tuning (which is erected out of the perfect intervals of the natural tone row) gives us an excellent picture of the diatonic major and minor systems and of the old diatonic notation. However, in the common usage of music up until now, the natural, just, and tempered intervals were changed and also combined.
The endless number of intervals within an octave (the others are, to be sure, only repetitions) form the interval-(color)-totality in music.

Any equal temperament divides the interval (color) circle into equal parts within the octave. By this means a principal representative is selected from each color ("interval-complex"). (See particularly the diagrams.) This is reminiscent of a color circle, in which all colors are uniformly included in endless shadings. As soon as this circle is divided into equal parts, then a principal representative from each color must be there.

Every equal temperament is therefore a tone-color totality.

In order to realize all "pure" tone-colors, we need an instrument with an infinite number of tones. These tones must be constituted essentially without partials, without noises, so that one actually differs from the other only by pitch (thus analogous to the piano or harmonium, only infinitely more perfect). These tones must also have the feature that one could begin to play them at any volume and could sustain them to any length. And now we return to this infinitely more complete ideal instrument with which one could completely realize into existence any music intuitively experienced.
Here is the starting point: tones cannot be produced without overtones and noise. What remains? One must be satisfied to produce tones with the proportionate noise and harmonic series. Not even once is this possible! For example, consider the transition from the two strings to one wound (or silver-colored) string of the piano, and ask a piano-maker what the difficulties are. Moreover, the infinite number of tones—who can tune them? How many hands must play them and how are they notated? What is to be done? We operate under the concept "infinite" as does the mathematician (similarly as in the calculation of the volume of the circle out of innumerable isosceles triangles, whose sides of the radius and whose basis is the circumference. We imagine a circle from whose center emanate so many radii that one lies next to the other.) Therefore, innumerable intervals are all of the intervals and therefore all of the colors. With all of the intervals, one can produce every tone-color and naturally that of any orchestral instrument whatsoever. Moreover, it must not be forgotten that noises are necessary in the exact production of the tone of a tuba, for example. However, we want to vanquish the noises in order to arrive exactly at the music (or should we set up a "noise-totality" in the form of a "noise-temperament" for certain "composers")? This will produce one of the most accurate renderings of the "pure" tone-colors originating from the musical intuition, from the melody, and appearing
to the musical listener more naturally than to the one who has to work at being musical. Bear in mind how that alone interferes, so that every tone produced has an unavoidable row of harmonics and also a certain amount of noise! Therefore we take proportionate ratios in order to move the special noises and over-tones (physical "tone-colors") into the background and the intervals (musical colors), the difference in the (relative) pitches, into the foreground.

Consequently, we further realize the concept, "infinite," in the mathematical sense: in innumerable, similar parts. (We complete the radii in the above described circle.) Consequently, a temperament with 1,200 tones—1,200 equal steps within the octave! We scarcely have the power of discrimination for these hues. [According to the experiments of Ellis and Stumpf, one "cent" (i.e., the hundredth part of a tempered half-tone) can be distinguished by the human ear only with the aid of the beats.] Therefore, we hear less than a hundred per octave. That gives perhaps 700 (audible) tones within the seven octaves. Who can play them? write them? Even less: thirty-six 1/6 tones, or: twenty-four quarter-tones. At the present time, Busoni and other "temperament"-scorners are already stirred up. Up until now occidental music has been satisfied with twelve half-tones—whether it is a question of a mere self-satisfaction, that is the question—and it requires a great
musical power\textsuperscript{1} to comprehend this as a fixed form. And a fixed form must include these twelve half-tones since without it the creation of a melody, even the mere singing of a certain interval, would be impossible.

\textsuperscript{1}This power is essentially the prerequisite of the trade of every piano-builder and tuner serving the art. Just as a genuine and proper piano-maker, without initial knowledge, should consider "musical intuition," that is, actually the totality of the tone-color circle.

Why we have decided exactly on the series of twelve half-tones is certainly not conditional, and may possibly never be determined with certainty. Perhaps it exists in a difficult to understand relationship with the twelve-step color scale. Sound and light are not only interrelated (etymologically) as words. There is a remarkable, quite certain conformity which is not accepted voluntarily between the color circle and the tone-color circle. Let me allude to an example: If one arranges the twelve shades of the color scale under supposition, so that a certain tone-color (interval) corresponds to each individual (shade) in the row succession of the chromatic scale (c, d-flat, d, e-flat, and so on) then there results an extraordinarily beautiful color-harmony.

The tone systems of all the people of the earth swing between the harmonic series and the tempered systems, which are often differentiated in quarter tones. (See the exhaustive researches of Stumpf, Ellis, Land, Baglioni, Engel, Fleischer, among others.) By a careful consideration of Diagram B, one will become familiar with the tone universe more easily. One observes, for example, that the 11th and 13th partials are definitely quarter-tones: the 13th thus forms a "neutral sixth" with the fundamental tone. The "evolution-optimists" are therefore of the opinion that our twelve half-tone system as yet signifies no limitations and therefore one day it can, by educating and accustoming the ear, arrive at a temperament with so many intervals that all the systems of the world may find a place within it. Now on that point, everyone may have his own thoughts and judge according to his own abilities, in so far as it is possible for him—to connect simultaneously an inner, psychic, spiritual, "musical" manifestation with a certain interval (quarter-tones, 6th-tones, and so forth). In other words: whether the finer "shading" of the intervals in temperaments with more than twelve tones produce something purely musical in them. My explanations are not affected by this.
The additional process would then be the opposite to the manner in which we have just used it: namely, from the twelve equal steps to the circle, then to mathematical infinity, and from there to spiritual infinity, to the "inner" movement, into the "totality" and out of it, to the movement of the spirit in the interval, in the color, to the fantasy, to the intuition, to "music." The "totality," the infinity (thus the spirit locked within), again makes use of some analogy to physics in order to reveal itself. Here the analogy is the circle, the equal temperament. The overtone intervals and just intonation divide the "circle" (if one wants to use this designation here) within the octave into unequal parts, thereby destroying the uniformity of the interval circle, the symmetrical division of the colors, the "totality." They "localize," and thereby fetter the musical fantasy.

Compare also the division of color to the solar spectrum. Out of the 170 degrees within it, 110 fall to the share of the cold colors—green, blue, violet, and a mere sixty to red and yellow. Also, in the third octave of the harmonic series with the yet clearly audible partials (fundamental, major third, fifth, minor seventh—4:5;6:7), the "descending" principle is manifested through the minor seventh. Perhaps this overtone octave corresponds to the spectrum of visible light, provided we conceive it namely from the "fundamental" (light-source) out of the development
of the particular "octaves" (spectra) and "intervals" (waves with their colors) according to the type of harmonic series. The prominence of individual partials of the various instrumental tone-colors corresponds to the spectra of potassium, sodium, and so forth. While the natural phenomenon partially emphasizes the "descending" principle, the "tempering" of the intervals and of the color produces the balance. (In Diagram B observe the irregular division of the overtone intervals within the octave.)

Goethe, in his Theory of Colors:

Beforehand, we were affected pathologically to a certain degree with the contemplation of separate colors, while we felt carried away toward separate sensations, sometimes swiftly and assiduously, sometimes gently and ardently, sometimes exalted to nobility, sometimes dragged down to the commonplace; thus, necessity directs us towards totality out of this limitation, which is innate to our organ. It establishes itself in freedom, while it presses the opposite on the individual, and consequently brings a satisfactory completion.

While we can thus declare that the color circle, as we have mentioned it, also produces an agreeable sensation according to the material, this is the place to make mention that until now, one has accepted the rainbow unjustly as an example of color totality. It lacks the primary color, pure red, purple, which cannot be produced, since the yellow-red and blue-red can scarcely be obtained in this phenomenon with the established prismatic image.

In general, nature demonstrates to us no general phenomenon in which the color totality is completely together. Only through experiments may such be produced in its complete beauty. As the complete phenomenon is assembled in the circle we make
ourselves comprehensible at best through paint on paper, until we, with natural talents, and after many an experience and practice, finally feel completely penetrated by the idea of this harmony, and actually feel it in our spirit.

Our ideal instrument then shrinks together into a pitiful sounding-board with tones—tones which are produced by means of the same noise and have the most similar harmonic series equidistantly removed from each other in pitch (tempered, an approach to infinity!) However, so that the tones can be arbitrarily played loudly and prolonged for a long time, neither the piano nor the harmonium fulfills the ultimate stipulation, when each is played by itself alone. These two instruments represent two extreme characteristic factors in the production of tones: touching and striking the air.

**ORCHESTRA; DIATONIC AND ATONAL MUSIC**

Melody, the opalescence of the intervals, is, with its contours, intimately bound to rhythm, and the whole fashions the form. Regarded from the musical point of view, the chord is a melody whose tones sound simultaneously, and therefore we "dissect" a chord in order to understand its "musical sense." After the overtone chord as such (reduced) resembles the diatonic scale with its triads, and the orchestral instruments, with their tones (intervals), are subject to the harmonic series (oscillations analogous to
the annual rings of a tree), then it is conceivable that the climax of the diatonic melody coincides with the climax of orchestral music. Haydn, Mozart! Compare the "genuine" instrumentation plan of a full Mozart score with the harmonic series:

```
- Violins, Flutes, Oboes, Clarinets
- Trumpets, Horns
- Cellos, Bassoons, Basses
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The decline (many say the "completion") of the orchestra went hand in hand simultaneously with the decline of this melody, which was only accelerated by "technical progress." (It took place in the music itself just as in the other areas of spiritual life.) The instruments, which originally were intimately bound up with the melodies, namely with the music lying in them and for them, were more and more divested of their individual character. By this means, their colors were "falsely and inauthentically imitated." Their "physical" side was only more exploited this way by the "technical" possibilities, which brought about the "noise," the sensuality, the speculation. Music became a "commodity" in the service of the "poetic" formation, the idea: Beethoven, Wagner, and many imitators. The goal was the union of the arts (certainly disguised
behind a "metaphysical" make-up) for the sensual enjoyments. However, there also came about the "rebirth" of the purely musical, which is free from all that is unmusical, from the intention of wanting "to sculpt," and which grows out of the inner "musical" life of mankind.

The more that music alienated itself from its own character and departed from the melody which was replaced by the "leitmotiv," the more the tones with their "tone-colors" were compared purely graphically to matter, to noise, to "subject." By this means the "intervals" and interval-hearing—that motivating force within the "inner self" of the interval—retreated further into the background. The comprehension of the individual tones produced by various instruments as the "organic" whole of the melody became more and more difficult; indeed, even the melody became doubtful, so as to be lost entirely at last. The yearning after it is the secret and ever more clearly outstanding tendency of the musical creativity of the present. It will certainly occur to no musician to imagine that a melody realized by this means is musical, when each tone is played by another instrument.² The interval (its "movement"),

²In the Fifth Symphony of Beethoven, several chords are found in the first movement before the repeat, which are played alternately by the strings and woodwinds, and thus can be produced only by a quite excellent orchestra in order to grasp its musical connection. As a rule, the succession of these chords sounds generally incorrect in the orchestra, but not on the piano.
obstructed by the "resistance of matter," thus necessitates the clearing away of the graphics from itself as much as possible, so as not to jolt and trip over noises. The characteristic phenomena of the present musical life are not isolated manifestations, but exist in connection with the change which the entire European intellectual life now makes manifest. This can no longer be denied: the end of "idealism" is here, even though philosophy professors and Wagnerians as yet do not really want to believe it.

All (forms, expression, sounding-means) must be born anew from out of the atonal melody, which, as a principal model, underlies the creation of modern music. It has already become visible (audible) in several works, and at the same time its "musical" comprehension is also the musical understanding of the new music. To be sure, one can, for example, set up a development row for its "tone-relations" (thus its outward appearance) in the "melody" modulation of Reger, among others, but this is only external. Just as one can scarcely define the nature of "melody" (which is something purely spiritual taking place in the inner man), so will one scarcely find a definition for the nature of the atonal melody in particular. The laws of the diatonic melody are easily derived out of the structure of the harmonic series with its fundamental (tonic), the dominant, the tonic triad, and the major scale, or even better, derived out of the system of just intonation. The triads of the tonic,
dominant, subdominant (with their closest relationships) are at the root of melodies cadentially; they will always be conveyed, like a leading tone (or also as "passing tones"), into these triads. Concerning modulations, the new tonic is always produced by the transfer of the fundamental with its related group (harmonic series). (A procedure which in the previous period was manipulated quite "mechanically" and led to those mountains of fallacies.) The atonal melody, however, completely ignores the old "resolutions" and "progressions" of the triads. Take as a simple example of an atonal melody the whole-tone scale, which, from the outset, equally removes the tonic triad in major or minor, the dominant and subdominant, and the leading tone of the seventh step. Therefore it is not by chance that one may understand the whole-tone scale with this "resolution."

![Whole-tone scale](image)

The laws of consonance and dissonance are no longer valid for the atonal melody, as they find their expression in the diatonic with their "resolutions" in the triads. Entirely by itself the atonal melody creates its own tension and relaxation points, out of and independent of the
physical-physiological ("natural") relations of the harmonic series, with its triads, consonances, and dissonances. Indeed the physical ear (but not the spiritual), which adheres to the harmonic series, to nature--each ear, in whose "objective" actuality the "élan vital" is broken down in matter--is subjugated in a certain sense to these relations. The atonal melody is certainly far removed from "nature;" however, if it is genuine, something purely spiritual, musical--the "melody" is "kat exochen." Since the atonal melody scorns all "natural" relations, and since the orchestral instruments are subject to the harmonic series and its oscillation laws, therefore it may not be played on flutes, oboes, horns, nor on violins. The "hearing" of the "melody," of the "music," is made more difficult or quite impossible for the listener by these means.

In the orchestra the "natural colors" which are subject to the intervals of the natural tone certainly predominate. All nuances, flute-like tones, natural tones, overblowing, and so forth, of the various orchestral instruments are dependent on the oscillations of the "nodes" of the open strings and on the column of air of the pipe. The further removed the tones of the orchestral instruments are from the simple vibration-ratios of the harmonic series of the open string and the column of air, the more difficult it becomes, and the nearer it is to ("dissonant") noise, which
results from the "stopping" of the oscillations. An imperfect, "tempered" fifth played on a flute, for example, brings the entire instrument, as it were, to "drumming," vibrating, tremolo—in the course of which the tone quality is taken from the noise produced and disappears almost entirely. The C-sharp on the G-string of a violin (as opposed to the open G, which swings "freely") is a dissonant noise-tone and has the tension to resolve itself "from out of nature" to the D (simple vibration ratio 1:3). (See the diagram.)

As for the clarinets and other woodwinds, the "chromatic," "enharmonic" tones are made to fit ("unequally tempered") between the nodes of the partials (similar to the strings on the violin). Each tone of an orchestral instrument has a quality and quantity arising either nearby or at a distance from the "free" swinging of the strings.
or columns of air which is not absolutely proportionately
equalized in the strength of the player. Neither the best
instruction nor the greatest virtuosity helps at all. For
that reason there can be no discourse at all in repeated
reference to an equal-tempering of the orchestral instru-
ments. Not only the C-sharp on the violin, but also minor
seconds, primes, major sevenths, fourths, and augmented
fifths are generally dissonant intervals urging "resolu-
tion" on violins and orchestral instruments, and therefore
are only genuinely suitable in diatonic music. An atonal
melody (which can never belong to a violin, flute, or horn)
is interrupted by these "track-like" intervals of the
orchestral instruments with their "natural" "resolution-
tendencies" clinging to the "subject." On an orchestral
instrument it sounds like a "falsely" played diatonic
melody, which in a certain sense is "natural"—that is,
a melody growing out of the "natural" harmonic series. On
the other hand, the atonal melody takes its point of de-
parture not from the "natural," "physical" proportions of
the harmonic series (of the horn, violin, etc.), but from
the interval itself in its purely spiritual, even "musical"
significance. In each of the intervals (apart from their
"natural" relations to each other as they arise out of
"nature" into the "objectiveness" of the harmonic series)
only one of suitable colorful and rhythmic force is based
upon the interval in question, which includes even the "spiritual," "inherently-musical" significance of this interval within itself. Whoever protests that a major seventh is only a "dissonant-making" transitional interval to the octave still hears "naturally," "sensually," "diatonically," and not "spiritually," "musically," "atonally." Whoever wants to hear "spiritually" and intuitively must be capable of perceiving each interval as independent of the others, as tone-color and original rhythm—thus spiritualizing it completely, "demechanizing" it while liberating the ear from the force of "objectivity" which was forced through the unmusical and musically peculiar "completion" of orchestral music in the course of the nineteenth century. The orchestral instruments, with their "harmonic-tracks," mislead the ear again and again to hear diatonically, "graphically." The "equal" tempered instruments, with which the twelve half tones are equally graduated and balanced (so that each "free" individual can vibrate, being independent from the others) give expression to the intervals in the most conceivable "spiritualized" form. To be sure, many people hear nothing other than the orchestra in the sound of the piano. To them, however, the "meaning" of equal temperament and the transcending significance of the piano in relation to the orchestra has not yet unfolded. Whatever is to be played and heard from the piano could not be heard, as long as one used this
instrument exclusively as a substitute for the orchestra--
and this always proves inadequate.

The "tracks" [i.e., predilection or natural tendency] of the partials are perhaps also in our physical ears, which "remain connected to matter," and then naturally ascend into the brain. These are "listening habits" which become rooted in the "natural" proportions of the harmonic series--in the "inactivity of matter." They can only be overcome by the "spirit," that is, by the musical intuition [with "supersensual," creative (not "habitual") hearing of the intervals, which brings forth out of its purest clearness the atonal melody as its original creation.] In a certain sense, the "spirit" forms the "matter," the physical ear. It actually "hears;" it is capable of comprehending the intervals detached from their "natural" functions as "melody embryos." The ears of the one who only hears "physically," "naturally," "mechanically," are "dead." What the nineteenth century inherited from Beethoven was its "dead" ears. For there were certainly no musically living ears which experienced the fulfillment of their aesthetic longings in the music of Wagner. To be sure, the spiritually living ear of Beethoven, which in the very last quartets and sonatas acquires the ascendancy--if only in a disconnected manner--finds its continuation, its "goal," best in the atonal melody of our time. Beethoven's struggle was
between the purely spiritual, musical act of hearing and the mere physical, natural hearing process. This ever recurring "wanting to return" to "nature," to sensuality, this "falling away" from the purely musical in the "spell of the idea," in the service of the "program," this struggle deteriorating finally into the deaf-rage, led, on the one hand—with the complete overthrow (overexcitement) of the physical, "sensual" hearing—to "noises" (see among others the passage in the Ninth before "O Freunde, nicht diese Töne") and on the other hand to the rich chromatic passages (one could almost say "atonal") of his last works which point to our time. Perhaps for the first time we now understand in the correct sense that the protest which was raised by the violinists of that time against the impracticability of these passages was not unfounded, and was quite certainly not based on the insufficiency of their technical skill. An atonal melody as well as one approaching atonality cannot even be played on a violin or any other orchestral instrument in general. The reply of Beethoven was just as characteristic: "He believes I am thinking of his miserable violin when the spirit is speaking to me."
The diatonic melody must show consideration for the "natural" proportions of the violins, horns, and so on to the point that the "musical" imagination of the artist becomes fettered. The closer that the diatonic melody approaches the atonal, the more "the spirit speaks," and the more
musical the inherent intuition, the more it comes into conflict with these "natural" proportions. It is flatly objectionable aesthetically to let a purely atonal melody become physically audible on an orchestral instrument.

Beethoven was not quite able to overcome the "sensual" in music and therefore lost the mastery over the "material" towards the end of his life. The "rape" of the instruments begins with him. The first of the purely atonal melodies was held in reserve in order to clear away the coarse, sensual, and "graphic" working of the nature-music and program music of the orchestra.

27 OSCILLATIONS OF THE UPPER HARMONICS

Among the tempered instruments (piano, harmonium, organ) the color effect of the individual intervals is substantially strengthened through the harmonic oscillations. Therefore, one speaks of "equal" temperament to show the equal beats in the case of all fifths, fourths, all major seconds, and so forth.

For example, play the fifth, c to g, on the piano. The second overtone of the c is g, which as a perfect fifth, the comma lies over the dotted line. (See Diagram B. [Nauer's Diagram is obscure.]) The first partial of the "tempered" g (its octave, g) lies on the dotted line, consequently lower than a comma, and therefore will enter in with the overtone of the c in beats. A similar procedure may be
conceived with all other intervals, their tones, and overtones on the piano. These harmonic beats are adjusted through the temperament in accordance with theoretical principles, and are different for each interval (though characteristic with each interval), so that they strengthen the sensuous influence of the colors. Consider also the "charm" of the beats of the vox celesta.

The physical explanation of these data (interference-manifestations) is found in every physics book.

There is also a need in atonal music not to ignore the refined, spiritualized, "aesthetisized" sensuality.

THE LEADING TONE-TRACK

The pure intervals (and also the partials) force the ear into certain "tracks" which resemble the annual rings in wood. In equal temperament, however, these tracks are completely removed, and therefore the union of all tones is permitted. Similarly, marble, in opposition to wood, permits cracking in all directions. Up to now, this resulting feature of temperament was not known—indeed, also not needed—since music was almost exclusively made in major and minor (thus the domain of the partials with their dominant action). Even now there are men who still have in their ears the "natural" tone progressions and resolutions (which cling to the mechanics, technique, and form of the orchestral instruments). Although they "hear," these men
are not yet capable of overcoming the "inertia of matter," and label temperament as a "forced device with mediocre serviceable intervals," as a "compromise," an "armistice," and the like, without considering at the same time that the "modern" common "voice-leadings" and modulations are generally possible only directly through the disdained "temperament."

The "tracks," however, are still brought out by the diatonic consonances and dissonances (of the harmonic series, the partial row). The strongest among them is the 28th seventh tone (leading tone!) of a major or minor scale. It hurries to the complete consonance, to the octave, to the first partial. If it is taken "purely," (see diagrams!), then there is no escape for the physical ear; it permits no other interpretation than this:

\[ \text{\begin{tikzpicture}[baseline=0pt]
\draw (0,0) node[dot] {} -- (1,0) node[dot] {} -- (2,0) node[dot] {};
\end{tikzpicture}} \]

Its next of kin is the minor second, which can be considered as its inversion:

\[ \text{\begin{tikzpicture}[baseline=0pt]
\draw (0,0) node[dot] {} -- (1,0) node[dot] {} -- (2,0) node[dot] {};
\end{tikzpicture}} \]
(Observe the relationship of the "leading-tone affinity" of the individual interval with that evoked by the complementary colors in Diagram D, and compare what was said above to the arrangement of the colors according to the tempered half-tone scale.) Atonal music has proved to be completely in conflict with this strongest of all physical (diatonic) tracks. With it, the major seventh has become an independent interval which takes the same position as all the others. Using the old terminology one might say, it may have become consonant. One may now see in the diagrams how the temperament adapts its leading-tone significance to this interval. It is so strongly modified that it turns out to be almost C-flat. Therewith is this strongest track removed completely. The modification of the minor second, however, is just the opposite. The next strongest leading-tones lead into the fifth and into the fourth—consequently into the next most consonant intervals of the harmonic series. The tritone:

In addition, notice how the temperament takes that which is physically unequivocal (the expressed F-sharp or G-flat meaning), and leads directly to the bisected point of the
octave. Not one beat of pure, atonal music could be correctly played if a clean sweep were not made of these "tracks." The additional leading-tone tracks of the just intonation, with their "resolution tendencies" which lean toward either the fifth side or the fourth side, are now becoming clarified. Indeed, their "natural" progressions have been invalidated a hundred times in atonal music.

There are no more equidistant consonances and dissonances which are equalized in the noises and harmonic series among the tones of the equal temperament. From each tone one can describe the whole circle outward with it, while in just intonation, there are only two alternatives (as with a groove or spiral). Therefore one must have recourse to the "mechanical" means of enharmonic permutation. For example, picture the whole-tone scale in just intonation: c, d, e, f-sharp, g-sharp, a-sharp, b-sharp, c-double-sharp, d-double-sharp, and so on. Or: c, b-flat, a-flat, g-flat, f-flat, e-double-flat, d-double-flat, and so on. One would never return to c, unless one helps himself by suddenly playing a-flat after f-sharp, or the reverse. (This must be done if one uses the old diatonic notation.) In addition to that, the whole-tone scale no longer passes through the equidistant tones and may be destroyed while taking on an entirely different sense. (The ear would then anticipate a g—a "resolution"—for
example, between f-sharp and a-flat, and so on.) Therefore it follows that the whole-tone scale can be played correctly only on an equal-tempered instrument (piano, harmonium, organ). Moreover, a new interpretation can be given to a diminished seventh chord struck on a piano, which would not be possible with the "just" intonation (for example, in a good orchestra). Consider the enharmonic permutation from the just a-flat to the just g-sharp, and make a comparison for that purpose with the following illustrations:

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\[\text{enharmonic permutation}\]
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In such a situation (resulting similarly and continually in atonal music) the audible transformation of the a-flat to the g-sharp must result (in the "just" intonation).

On the piano the physical reality of a chord in equal temperament is in and of itself quite meaningless; for that reason, the "musical" fantasy directly guarantees the greatest freedom of movement to the "spirit" from all sides (with its totality). The physical temperament is a neutral, harmless, indeterminate, non-sensual, even-"tempered" noise, which only obtains its "meaning" through the "music," exclusively from the spirit. This is not the case with the orchestra; there are "tracks" which cannot be circumvented.
Certainly, the orchestra must be tempered (quite on account of the above cited enharmonic transformations in order to make it "unmechanical," "melodious," as much as possible). However, this tempering is unequal, optional, subject too strongly to chance, to matter to the overtone laws, to mechanics ("chaotic"). Therefore, it is to be used, if need be, not for the "diatonic modulatory" music, but for the atonal. In addition to this and in conformity with its inner, musical character, atonal music ignores the "local," "perspective," "stereotyped" properties of the orchestral instruments (trumpet fanfares, violin glissandi, drum rolls, etc.). With the "perfecting" of the orchestra, music, which is yet the typical "unnecessary" art, became even more "unnecessary"—that is, alienated from its real nature.

In its complete purity the atonal melody is the embodiment of the absolute reality of melody. It draws the ultimate conclusion out of the "unnecssariness" of music, while it brings out completely the "inner" reality from itself, which it still had with Bach, Haydn, and Mozart. However, this reality was soon to be changed over into another in the conception of Beethoven. It is at variance with the nature of the musical—which men in the course of the nineteenth century understood less and less—to use music as a mere means of expression and description. The atonal melody alone is capable of rehabilitating itself
again. The absolute objectivity of the melody eventually furthers the relinquishing of the personality. To obtain an absolute objectivity of the melody, there can be no part of the personal experience in composing. Thus, the final result of atonal music shows an essential contrast to the entire European life-spirit up until now. It is a question of the contrast between the musical intuition and the conception of the idea. The same things /understanding and intuition/ governed the pre- and post-Christian spiritual life of the occident, which hinged on the development and effect of the personality.

INTERVAL COMPLEXES

Through the "modifications" of the "pure" intervals in our temperament, the "physical leading-tone tracks" are removed, and thereby the spiritual, purely musical character of the individual "interval complexes" is really made manifest for the first time. The just c-sharp and d-flat of the drawing below form the extreme borders of the interval complexes. Moreover, the tonal development process, prime--minor second, generally sounds "false" to our ears.
Therefore, many harmonics (partials) are not really usable in music at all, since they go so far beyond these limits (see Diagram B: tones 11, 13, 7). The "tempering," which occurs within the "pure" intervals, is "equal" in one unique point—that the twelve tones are equidistant from each other. However, they are "unequal" in all other points and are therefore not usable for atonal music (which is derived from the "totality"). The point of equal temperament is, in a way, the "center of gravity" of the total interval complexes. (Compare Diagram A in addition to this.)

THE LAW OF INTERVALS AND KEYS

Whatever one hears from out of an interval is what he places into an interval—-that is the action of the intuition, naturally not one of choice. We will see that in the source of the diagrams and out of the music literature of all times is found a law for the musical significance of the intervals, and in connection with them, the distinction of a major or minor chord and the diatonic keys: therefore the "tone-color theory" in the truest sense.

It is obvious, therefore, that one must begin from one certain tone while singing a melody, or the piano tuner must establish his pitch from a single tone (A) out of the circle of temperament, or that someone had to begin with the alphabetical naming of the tones likewise with one tone. These are things which are easy to see, but have little import in
the "musical." Instead, they are arrangements. We must ascribe a greater significance to that which already touches the spiritual, so that we derive the keys from a basic key (G Major) and set up sharps and flats as signatures. Since we already see the "spiritual" (formal) significance of this process, it is quite immaterial from which absolute pitches we start. That is, once we have chosen a basic key (in any register whatsoever), we term it C Major; then the other keys are grouped immediately according to the interval law, resembling crystals or coral, as well as plants gathered around the main stem. (See Diagram B.) This musical, mathematically demonstrable process takes place inspirationally within each musician from childhood onward, without addition from external influences. Thereby each key receives its character through its relationship to the basic key, through its position in the "system." All basic tones of the keys stand to the tonic C in a fixed interval- and tension-relationship, independent of the absolute pitches, but containing a "spiritual" significance within. This was decisive for the "musical" all along, and is, "eo ipso" on that very account the "spiritual" character of the key in question. (Naturally only in a "genuine" music.)

Inner conformity is nothing other than the "transcendental" conformity of musical hearing. According to this, the keys in the order of the circle of fifths and fourths,
including the totality of the intervals, grow organically out of a basic tone used arbitrarily according to the absolute pitches. Even among musical men, a doubt which is quite inconceivable to me exists about it, and I want to demonstrate in a few words how I, myself, arrived at the discovery of the law of intervals and keys. Commencing a study of classical works, I was especially struck with the compositions of Bach and Mozart in that a certain conformity exists among the expression forms of the individual keys. For example, all pieces in D Major have a light, speedy, exulting (allegro) character, those in A-flat Major a solemn, flowing (andante), and so on. Now the question was this: what can have induced the composers to apply this or that character to a musical composition in this or that key? Physical factors actually play a great role in the orchestra (for example, A-flat Major sounds very gloomy as a result of the characteristic proportions in the partial "tracks" of the instruments). Such factors cannot have been exclusively decisive, since this occurrence was observed with the piano also, in which relatively equal physical ratios are prevalent among the keys. This phenomenon, lasting through centuries, constant in spite of various external circumstances, and occurring among all "genuine" great musicians, had to have a deeper, "spiritual" root. Quite slowly I began to call to mind that the musical character of a composition in D
Major, for example, corresponds to the "bearing" of the major second, that of A-flat Major with the "emotion" of the minor sixth, that of C Major with the octave, etc., etc. From this realization, it was only a step to the arranging of all twelve intervals in the circle of fifths and fourths with their "complementary" contrasts, and the formula for the law of intervals and keys was discovered.

CHARACTERIZATION OF THE INTERVALS (KEYS, TONE-COLORS)

Once more we must work with the "inherent-musical" meaning of the interval, and face the fact that all genuine musicians of all times used specific intervals and tone-colors, according to the corresponding keys and instruments, for the specific musical character of their music.

Goethe:

Out of the idea of the contrast of the phenomenon, out of the knowledge, which we have acquired from the selfsame particular analysis, we can conclude that the individual color impressions cannot be changed—that they must act specifically, and certainly produce specific conditions in the living organ.

This is also true in the mind. Practical experience teaches us that the individual colors give a special frame of mind.

Musically and theoretically we are accustomed to think from C. Our notation, the system of perfect intervals, the old keys, the human voice ranges (bass and soprano can attain the one-line c, C clef), the formation of the keyboard
(white keys as C Major), and so forth, have brought about the result that our interval perception takes its starting-point from C. When we regulate the circle of intervals (the circle of fourths and fifths) from C outward, then each tone acquires its specific meaning through the interval which it forms with the C. The character of the octave is thus identified with that of C Major, that of the fifth with G Major, that of the fourth with F Major, and so on. (See Diagram D.)

It has already been shown that the absolute pitches do not play as important a role as many believe. It is merely a convention or custom of the "physical" ear in the age or land in question, and so forth. The keys, with their character (intervals from the concentration point of C outward), exist primarily in the "spiritual" ear—or they do not exist at all—and then are produced and shaped within the resonating body (through playing, attacking, expression, etc.). Certainly, it is very beneficial for our nerves when we hold fast to a conventional tuning.

The octave is the only "perfect" interval in the equal temperament; it is the musical manifestation of the liberated, of the illuminated—the point where spirit and nature are in contact. In the octave, the same tone returns at a higher pitch. Since it produces no harmonic beats, and therefore no "tempering," (see above and the diagrams),
then we can compare it to white light quite well. (Consider that passage in the *Creation* of Haydn, where the full orchestra sounds the C Major chord at "Es werde Licht.")

Goethe:

> Colors are the deeds of light, deeds and sorrows. The formation of color and the identification of it are one and the same.

> In general, it is viewed and determined according to two sides. It produces a contrast, which we term a polarity, and can be designated quite well by a plus and minus: plus--minus; yellow--blue; action--deprivation; light--shadow; bright--dark; strong--weak; warm--cold; near--far; staccato--legato; affinity with acids--affinity with alkalines.

Intervals of the fifth (fifths, major seconds, major sixths, major thirds, major sevenths, augmented fourths) gravitate upwards; they have an impulse toward movement and have been bound with the ascending principle from time immemorial. Indeed, according to the degree of its "modifications" (temperings) (see diagrams, number of commas) we can compare it with the lively, warm colors of the "plus-side"--yellow, red--in which Goethe perceived activity, vivacity, and aspiration.

Intervals of the fourth (fourths, minor sevenths, minor thirds, minor sixths, minor seconds, diminished fifths) have the propensity towards calm; they are the decreasing, terminating principle. To them, the calm, cool colors correspond to the "minus side"--green, blue (according to Goethe), corresponding to a weak, yearning sensation.
We can also bring the color circle into agreement with the interval circle outward from $C$, whose deeper motive is presumably to look into the spiritual identity of seeing and hearing. (See Diagram D.) One cannot compare the tones (abstractly conceived as points) with the colors; however, one can indeed compare the intervals, the sounds, chords (tones as timbres with the overtone chord) with them. We then take the $C$ (white) as the boundary point between green and yellow, and also the other tones of the circle of fifths as shadings from: yellow—$g$—orange—$d$—vermilion—$a$—crimson—$e$—scarlet—$b$—purple—$f$—sharp—blue—violet—$d$—flat—ultramarine blue—$a$—flat—turquoise blue—$e$—flat—bluegreen—$b$—flat—metallic green—$f$—light green. $F$-sharp ($g$-flat) (in reality black) thus forms the strongest contrast to $C$.

It has been stated above that minor already signifies the first step in the spiritualization of music. The physical whole is major since the major triad is included in each tone of the overtone row. In the major keys tone-color confronts us most naturally (physically striking the eyes). In the minor keys the interval of the minor third (to $C$!) plays a role (in its interval relationship to $C$) along with the "color" of the fundamental tone.

We will now pass through the circle of fifths and affix to the corresponding tones (keys, intervals from $C$ outward)
all manifestations of the color effect in music (and in connection with it, also the rhythmic phenomena). Compare Diagram D with the other diagrams and with the following summary. Considering each tone, first look at the interval in question from the standpoint of C, and notice the nucleus of its "movement," of the "manifestation." (Intuitive listening.)

The melody of the octave.

C: Jupiter Symphony of Mozart
   
   First Prelude from the Well-Tempered Clavier of Bach, Book I.
   
   Victory and Marriage Marches. Solemn, festive hymns.

The chaste, pure tone of the oboe, its dominant position among the woodwinds, its conical bore and the overblowing; thus, its pronounced c-character.

Fantasie in C Minor

The old Lydian key (Ionian style)

The melody of the augmented fourth or the diminished fifth.

F-sharp:

The Promethean tone: complementary to c (observe the comparisons of the colors also in the following)

Exactly on the border between "pure" g-flat and f-sharp (see Diagrams A, B, C); halfway between the dominant g and the subdominant f; perceived as a lively tone by our spiritual ears (fifth interval)

In the orchestra this color is very rare; the usual orchestral keys--e-flat, b, f, g, d, a--include nearly half of the color circle only; this is not consistent in the orchestra (see above)
University lecturer Dr. Wilhelm Fischer has called the following to my attention: in the first part of the St. Matthew Passion of Bach, the chorus, "Sind Blitze, sind Donner in Wolken verschwunden," and the second part, "Eröffne den feurigen Abgrund, o Hölle," are in F-sharp major.

Goethe:

That unrest (of red-blue) increases with intensification, and indeed, one can assert that a tapestry of an entirely saturated pure blue-red must be a type of overpowering presence. Crimson is a color which must be very odious to Frenchmen since they designate the expressions *sot en cramoisi* [silly] and *méchant en cramoisi* [reprehensible] as the extreme of bad taste and wickedness. (Also, see below: Goethe on purple in connection with b.)

The melody of the fifth.

G: Old-fashioned sound: something resounding like the trumpet (prominence of the second partial, fifth beats!) very superficially trivial.

Chambermusic in G among the Classical composers (national anthem originally in the old fashioned sound) now frequently transposed to E-flat Major and performed with military exuberance.

That which is accented: primarily the first, heavy beat; ceremonious rhythms.

In G Minor the color is diluted by the gentle somewhat ponderous B-flat.


In the G-Minor Symphony of Mozart, the sunny, light G is beclouded by the autumnal, hazy B-flat.

The old Ionic key.
Goethe:

Yellow is the color nearest to light. It appears at the slightest mitigation of light. In its highest purity, it always carries with it the nature of brightness, and possesses a cheerful, gentle, delightful character.

In this state, it is agreeable when applied to clothes, curtains, tapestry. Gold, in its completely unmixed state, gives us a new and higher concept of this color, especially when a shine is added. When it appears on shiny silk, for example, or on satin, a strong yellow has a magnificent and noble effect.

Consequently, we learn from experience that yellow makes a warm and agreeable impression throughout. Now this color, when it is pure and bright, pleasantly and delightfully has something cheerful and noble in its full strength. On the other hand, when it is soiled or pulled into minus to some extent, it is externally delicate, and produces a very disagreeable effect. Likewise, the sulphur color, which inclines towards a shade of green, becomes somewhat unpleasant.

The melody of the minor second.

D-flat:

Works by Chopin in D-flat.

Delicate, sentimental touch; leggiero.

In C-sharp Minor, the D-flat is neutralized by the fluctuating of E to C-sharp.

Moonlight Sonata by Beethoven.

C-sharp Minor Fugue by Bach in the Well-Tempered Clavier, Book I.

Goethe:

Blue deepens very slightly into red and thus acquires a somewhat active character, though on the passive side. Just as that of the red-yellow, its attractiveness is of quite another sort; it may be said to disturb rather than enliven. As the intensification itself is irresistible, one wishes to
progress with this color also, but not as with the red-yellow, which always advances energetically forward. Instead, blue progresses toward a point of rest.

The melody of the major second.

D: The violin tones (prominence of the eighth partial, beats of the major second!)

Violin Concerto of Beethoven.

Innumerable violin melodies of Mozart . . .

Chorus, "An die Freude" in the Ninth of Beethoven.

From the Requiem of Mozart (Sanctus:) "Vol sind Himmel und Erde deiner Ehre . . ."

In D Minor, the noisy, sparkling D is muted by the serene F (reflective, meditative, sentimental). Renunciation of sensuality.

The old Phrygian key (Corinthian style).

Among the ancient Greeks, this key (color!) was used for healing purposes in mentally deranged cases. Furthermore, Viennese waltzes are frequently in D Major, a key which increases wantonness and enables one to enjoy life to the fullest while dancing:

Goethe:

Since no color is observed as always being stationary, one can intensify and enhance yellow very easily through compression and by darkening it into a reddish (color), which grows in energy, and appears mightier and more splendid in red-yellow.
The melody of the minor sixth:

A-flat:

Romantic sound; Schumann


Goethe:

Just as yellow is always accompanied by light, so can one say that blue bears a principle of darkness within itself. This color produces a singular and almost indescribable effect upon the eye. It is more energy than color; alone, it stands on the negative side, while in its highest purity, it is almost a stimulating negation. Its appearance is a kind of contradiction between excitement and repose.

Even as the sky or distant mountains appear blue, a blue surface also seems to recede from us. Just as we readily pursue a pleasant object which flees before us, so we gladly contemplate blue—not because it forces itself upon us, but because it draws us toward it. Not only does blue give us an impression of coldness, it also reminds us of shade.

The melody of the major sixth:

A. Spring. Innumerable examples!

In A Minor, the prolific, energetic A becomes somewhat relaxed through the solemn C.

The "Confutatis" from the *Requiem* by Mozart: "Wenn Empörung, Fluch und Rache wird gebüsst in heissen Flammen . . .

The old Aeolian key (Corinthian style).

Goethe:

All that we have said about yellow is also valid here, only to a higher degree. Essentially, red-yellow gives an impression of warmth and delight, since it represents the color of the greatest heat as well as the softened radiance of the setting sun.
The melody of the minor third:

E-flat:

**Third Symphony** of Beethoven

From the Requiem of Mozart: Hostias . . . "Opfer und Gebet bringen dir, Herr, lobsingend wir dar."

(Observe the subtle difference between the Beethoven-esque and the Mozartian styles; the one from the standpoint of domination, the other from that of the atoning church, which is subject to the Most High.)

Goethe:

It is not unpleasant when blue participates on the plus side to some extent. Aqua is a rather lovely color.

38 The melody of the major third:

E: Prelude in E Major of the *Well-Tempered Clavier*, Book I.

In E Minor, the color becomes somewhat paler through the G.

Mid-summer Night's Dream and other works of Mendelssohn. The old Dorian key (the first according to sources).

Goethe:

Just as pure yellow easily blends into red-yellow, so the deepening of the latter does not arrest the yellow-red. That pleasant, cheerful feeling, which the red-yellow imparts to us, increases into an intolerably powerful impression within the bright yellow-red. Here the active side manifests its greatest energy, and it is no wonder that energetic, robust, uneducated men especially enjoy this color. Among uncivilized people, the inclination for it is the same. And when children left to themselves begin painting, they do not spare vermilion and minium. The appearance of a yellow-red cloth alarms and enrages animals.

(See also: Goethe on purple, concerning B!)
The melody of the minor seventh.

B-flat:

**Fourth Symphony** of Beethoven.

Mass, Symphonies in B-flat by Haydn.

From the *Requiem* by Mozart: Tuba mirum spargens sonum . . . Benedictus . . . "gesegnet sei, der da kommt im Namen des Herrn!"

Prelude in B-flat Minor in the *Well-Tempered Clavier* (the devout, pious B-flat modified by the mournful D-flat).

The B-flat clarinet, the favorite of its family (prominence of the sixth natural tone, beats of the minor seventh).

Goethe:

Our eye experiences a real satisfaction from this color (green).

The melody of the major seventh:

B: **Preludes and Fugues from the Well-Tempered Clavier**.

The *Unfinished B Minor Symphony* of Schubert (the despairing, discontented B modified by the sensuous D, yearning for life; it could originate no finale.)

**B Minor Mass** of Bach (doubt—faith).

The old Mixolydian key (Dorian style) discovered by Sappho according to ancient tradition.

Goethe:

The effect of this color (purple) is as unique as its nature. It gives an impression not only of seriousness and dignity, but also of grace and charm. It accomplishes this whether in its dark, deep state or its bright, attenuated tint. And thus, the dignity of age and the amiableness of youth may adorn itself with degrees of the same hue.
History relates many instances concerning the jealousy of sovereigns with regard to purple. The circumstances surrounding this color are always seriousness and magnificence. Violet glass displays an illuminated landscape in a fearful light. In such a way must the purple shade be spread over heaven and earth on the day of judgment.

The melody of the fourth:

F. Pastoral Symphony of Beethoven.
In F Minor, the peaceful F is further deepened by the plaintive A-flat.

Appassionata by Beethoven.

The French horn (among all horns, the F-horn has been used the longest).

The old Hypolydian key (Ionic style).

Goethe:

... thus the eye and the soul pause. The beholder has neither the desire nor the power to imagine a state beyond it. Therefore, in choosing a color for a room in which one lives constantly, green is the color often selected for wall paper.

Naturally, the examples above can be increased significantly, through which one can grasp the whole. Don't interpret too narrowly the catchwords for the characterizations of the individual keys and intervals in Diagram D. As it is all but impossible to express something purely musical in words, the character of the individual keys is not so sharply defined. Everything musical, even the movement of the fifth and fourth, must be imagined in motion (no color is regarded as stationary, says Goethe), and, to be sure, even the movement of the fifth and fourth.
For example, G Major is often only an intensified C Major, E Major an augmented A Major; conversely, F Major is often derived from C Major, D-flat Major from A-flat Major, and so on. With some attention, it will not be difficult to recognize the relationships. Certain interval processes often play a great role in the melodies: for example, in the first piece of the Kinderszenen of Schumann, which is written in G Major, the "romantic" minor sixth is found three times in succession, and gives to the composition the flowing and delicate A-flat Major character. Schumann might have been able to write almost any of his compositions in A-flat Major. Chopin, for example, was a declared D-flat Major man. (Dr. H. Riemann has already alluded to this fact in one of his papers.)

The intervals play an exclusive role in atonal music, which originates from the "totality." Through them musical character is no longer expressed by major and minor keys or by characteristic instruments (thus by a color), but only by the totality of the intervals and tone-colors. This totality is of value purely on an equal-tempered instrument. In atonal music there are no longer any tonics, dominants, subdominants, degrees of the scale, resolutions, consonances—only the twelve intervals of the equal temperament. Consequently, its "scale" originates from out of the twelve tempered half-tones. In the atonal melody, not only the
purely physical and sensual, but also the trivial and sentimental are eliminated as much as possible. Its "law," its "Nomos," exists within, so that in a certain tone-row, no tone can be repeated, and none omitted. (In general, this is the original law of the "melody;" no tone receives a physical predominance—a dominating, fundamental meaning. Also, no scale degree significance or leading-tone track can arise. Therefore, the creating and the hearing is done only with the purely musical action of the interval in its "spiritualization."

For the reassurance of those who discover an "impoverishment" in atonal music, may I mention that these twelve tones contain 479,001,600 melodic possibilities (as opposed to 5,040 with seven tones). In each of these possibilities lies hidden a genuine atonal melody which is the task of the musician to create exactly from within. Again it must be pointed out that the intuitive hearing of the interval, the purely melodic hearing, is the prerequisite of the comprehension of atonal music. There is a great distinction between the intuitive "hearing" of the intervals, and the hearing of the "natural" tonal progressions.

To us Europeans, this sort of creating and hearing is still unfamiliar, and it is not easy for us to place our "individuality" wholly in the service of an "action" (this time, the musical action of the interval), in order to be
consumed in it absolutely. While composing the atonal melody, the "originality" of the individual must persist to "solve" a "case" (situation) correctly (we term it a "building-stone" in our "atonal school"). However, this necessitates the subjection of the whole "personality" in order to obtain the "action." In connection with our works we imagine that it is still more difficult to obey the original laws of the interval in its spirituality and to overcome the peculiar "emotional state" by pushing it aside than to "lead a full life" and "let off steam" in the personal rhythm and "handwriting" of an "emotional art."

Therefore with each of the 479,001,600 "cases" we presuppose a single possibility of the "correct" solution, which is to discover and realize musically the action and sense of composing.

Whether the musicians of all centuries correctly used the intervals (tone-colors, keys) consciously or unconsciously plays a secondary role in the review of all these questions.

COMPLEMENTARY INTERVALS

The complementary colors are mutually fulfilled in "white." In connection with the complementary intervals, when we "subtract" the smaller from the larger--for example, (see summary and Diagram D) the fourth, C to F, from the seventh, C to B, or the second, C to D-flat, from the fifth,
C to G—then the augmented fourth (diminished fifth) always remains. The remainder, "black," is nothing, no color.

While the result is negative with the intervals (tone-colors), it is positive with the colors.

THE SEVEN OCTAVES OF THE PIANO

In music higher (shrill) and lower (muffled) tones may correspond to brighter and dimmer lights. This comparison holds true also, when one considers that with the deeper tones, greater "masses" are set in motion and that the "bodies" even cast "shadows." One could compare the seven octaves of the piano with the seven color-intensity degrees which painters make use of in practice. The lightening of the colors, which tends toward white, compares with the upper piano range; the gradations into darkness, which tend towards black, with the lower piano range. The middle degree of shading between the three bright and the three dark octaves represents, as it were, a shade in itself, in an intensity which clearly permits the color gradation to continue in the circle (intervals)! One could compare it with the middle range of the piano,
designated by the piano-makers as simply the "temperament." The piano tuner begins to tune and to temper from that point outward. After he has finished tuning perfectly the temperament in this middle range, he tunes the other registers in octaves from there. Similarly as with the continuation of the intensity gradation in the color circle, the individual colors become ever more indistinguishable, not only according to the bright side, but also to the dark side. They lose their color character in that they lean too much either to the black or the white. In the same way, one cannot affix either above or below to the piano an octave whose individual tones permit recognition of the color-character of their interval relations. Just as in the middle region of the color circle are the individual colors the most clearly and pleasantly prominent, so also in the middle range of the piano does the tone-color character of the intervals become the most physically audible.

NOTATION

A notation is desirable for the purpose of writing down atonal music. This notation has a special symbol (dot) for each tone of the temperament (we name them: c, d-flat, d, e-flat, f, f-sharp, g, a-flat, a, b-flat, b).

Thus the "temperament" is not "makeshift," a "compromise," an "armistice," but the "diatonic notation."
On this occasion I might mention that I have created for my own private use an atonal notation\textsuperscript{3} which is simpler than the tonal, and which significantly facilitates my work. An observation must be made in connection with the old notation: the accidentals are always valid (also within the bar) only for the notes before which they stand.

The following is the "building-stone" of a pure, atonal melody in both the old and new notation:

\begin{center}
\includegraphics[width=0.8\textwidth]{atonal_melody.png}
\end{center}

\textbf{ATONAL INSTRUMENTS}

The suitable sounding-agents for atonal music are: the atonal (well-tempered) instruments (piano, harpsichord, harmonium, organ, celeste), and the human voice.

The piano has initiated the need for hearing according to the tone-color totality. Just as the painter produces through appropriate blending from out of a few paints a color circle, which at least comes near to the "ideal of the totality," so the piano-maker builds a resonating body

\textsuperscript{3}See page \textit{in "The Twelve-tone Notation."} Page 279 of Appendix II.
out of various, unmanageable materials. In this resonating body the overtone rows, noises, and magnitude of the tones are uniformly graduated, so that the "intervals" with their characteristic beats can appear in the foreground. Moreover, because of its pedal action, the piano is far superior to all instruments—even to the orchestra. Not only is the piano the most spiritual instrument, it is also the one which has overcome the opposition of materialism of the resonating body the most. The piano educates the ear in "spiritual" hearing (hearing of the "pure sounds," the "pure tone-colors"); but it also leads the unmusical man astray toward abstract, unmusical listening.

The human voice is exceedingly adaptable (elastic) and can therefore give expression to all intervals and tone-colors dictated by the musical "spirit." It is most important that the singer conceive the temperament, the "totality," in the spirit, so that he carries his art on from there, while liberating it from the sexual factor. For that factor exists beyond a shadow of a doubt.

Especially while singing, the human voice somehow appeals sexually, in dark processes not rightly comprehended. That which is originally musical (in its pure spirituality) is sexually neutral, just as is anything else spiritual. Sex is a fact of nature, quite certainly not of the spirit. What then should one think of a music which in the last analysis produces the need to advance the "horizontal
trade?" And there actually is such a music—in the "sacred temples" of the art of our time—this time!!—resounding, not by chance, in night cafes or dives.

In its absolute musical purity, the atonal melody will also create a change. Incidentally, it may be observed that the atonal melody moves about on that musical virgin soil which Gregorian chant has kept alive up to our day through many errors.

Atonal melodies cannot and may not be yodeled or whistled. Therefore in our singing technique we approach the "color-singing" of the Orientals, which locates the voice attack higher.

Perhaps something similar underlies the touch on the piano, the typical and most excellent touch—instrument—similar to the striking by the sculptor with the hammer on marble. The spiritual act of a formative conception in this material and perhaps the application of color onto a plain surface corresponds to "striking the air." The attack brings contour and rhythm into the "color." A color without contour, a contour (form) without color, is indeed thought to be abstract; however, it advances nothing concrete. This is obviously also true within the sphere of the musical. The rhythm must result directly from the
"agitation" of the color (Melos). Conversely, if this is first composed within, the whole receives an appearance of the "abstract."^4

MUSIC AND PAINTING

Perhaps while writing down the following passages of his color-theory, Goethe had in mind the interval, which is not only a musical, but also a physical, mathematical "element."

Man has long perceived that a certain relationship between color and tone occurs. This is proven by the repeated comparisons which have been drawn in a partly transitory, partly detailed manner. However, there is common misconception which should be avoided:

By no means do color and tone permit comparison with each other; both are related to a higher formula and both are derived out of a higher formula, each in its own way. Color and tone can be compared to two rivers which originate on the mountain, but flow into two quite opposite world regions under quite different conditions. Along either side of the mountain no individual point can be compared to the other the entire way. Both are general fundamental operations, acting according to the general law of separation and striving together, of fluctuation to and fro, of balancing for and against—and yet according to quite diverse sides in a diverse manner, in various emotions.

If someone wanted to comprehend correctly how we join the color theory to general natural theory, and substitute by luck and originality what has escaped

^4 The agogic and dynamic shadings result out of a correct interpretation of a melody, and make superfluous the overloading of the note-form with expression marks. Bach put almost no expression marks at all in his Well-Tempered Clavier. At first, any composer finds it necessary to write whole "novels" for each note. I write simply in my own compositions: expression according to the melody.
us, then, according to our conviction, the tonal theory is to be completely conformed to general physics, since it now exists almost only historically separated from the latter.

However, therein may lie the greatest difficulty—to destroy the music—and to break it up into its prime physical elements. Music had become positive for us, originating in the strangely empirical, accidental, mathematical, aesthetic, ingenious processes for the benefit of a physical treatment. In addition to this, it might be mentioned that where knowledge and art are found, after so many diligent preparations, so are time and opportunity.

Therefore, music and painting should not be combined with each other (although it is acceptable, since one and the same unknown root underlies the spiritual acts of seeing and hearing). Both arts are completely distinct and independent of each other. When they do coincide—not only in the sense of an arbitrary analogy, but also in the sense of a secret identity (which indeed is actually the case)—then that is a good sign for both theories. Perhaps the nature of both arts could be characterized in the following manner: the painter (also the sculptor, the architect) brings "motion" in space to rest; the musician releases the "motion" out to the great space of the "intervals" once more. (Music overcomes space; graphic art overcomes time.) Through exact measurements of the great artworks of sculpture, architecture, and painting, it has been incontestably ascertained that the proportions of
lines, curves, angles, colors, etc., very often correspond to the vibration ratios of the equal-tempered intervals.

Creative musical imagination is always due to the comprehension of tone-color, since the "color-hearing" occurs purely "intuitively" in man himself. One can easily ascertain the colors of light: for example, this gem is violet, or that one is red, blue, and so on. With musical tone-color, however, it is not so distinct: for example, the horn is fourth-colored, or the trumpet is fifth-colored. To declare horns, trumpets, and the like, simply as tone-colors would scarcely be better than regarding gems, metals, or woods as colors of light. From the outset, a much deeper investigation of the importance of the "colors" to music is necessary. What would the "tone"-color be if it isn't a chord or an interval? Possibly the noise of the individual color "body" or the noise of matter? Doesn't the painter have to pulverize the pigments into "innumerable, similar parts" in order to become as independent as possible from matter—and to be able to apply uniformly blue, green, yellow, and so on? And would this be a "painter," who papers the bare walls with every conceivable bit of trash (colorful materials, etc.) with dubious skill; and is this a "musician," who for the most part lets various "noises" whirl around in confusion under the pretence of a "great idea" in order to sustain a senseless and spiritless
audience lusting after "sensations" (in the most subtle meaning) to stimulate their "nerves"? Or, is this an interior decorator, who... Or, should someone actually so interpret the concept "tone-color-melody" that he adds other noises to each tone of a melody, (to carry it over into graphic terms) to each color, to other substances, gems, plants, coal, metal, and so on? Just as the painter obtains his homogenous pigments from out of all possible materials, similarly do we "pulverize" our "tone-color substance" in the temperament. Out of a particular instrument, we remove the characteristic overtone interval, the quintessence of its tone-color; that is, we separate the "color" from the "body" as much as is possible, loosen it from all non-essentials, and "perpetuate" it thereby. Until now we have had difficulty in compensating for the differences of the noises and overtones—even on one and the same instrument—and, even to the point of exaggeration (fingering virtuosity among the violinists, compass with the singers, intonation with the woodwind players, and so on). On account of the special, "diatonic" vibrations of the partials, a violin will produce an atonal melody (even-tempered exactly) just as an incorrectly played diatonic one, since this tempering can never be "equal" as a result of the "pendulum-like" vibration ratios. However, among the tempered instruments
(piano, harmonium, organ) a tone is independent from the others (and from its vibration ratios). Essentially, there is an instrument for each tone. Therefore it is generally possible to adjust the noises and the partials in order to push the "interval effect" into the foreground. Various noises turn the "spirit" away from "music" precisely because of their purely physical effect.

According to that interpretation of "tone-color" which secretly clings to noise, matter, and which perceives the ear as a mere "sense organ," there have always been "tone-color-melodies"—especially in the poorly constructed and played instruments. According to the "musical" side, these are such which move about in the "totality" and through which the colors are expressed by intervals. We now speak primarily of "tone-color-melodies," since the atonal melody, in distinction to the diatonic, actually utilizes the entire color circle, and thereby has essentially become the "color" melody, that is, the melody with various colors. (Compare the intervals of the whole-tone scale from C on, and that of the C Major scale in Diagram D. While the whole-tone scale spreads out into the entire circle, C Major moves around only in half, or "red-yellow." In addition, all other major and minor scales occupy only half of the circle; for example, A Minor: a, b, c, d, e, f, g, a).
Bach, Haydn, Mozart, and Beethoven have entrusted their most intimate, most thoroughly spiritual, most musical works to the piano. If, however, someone should believe that it is of great importance for "polyphonic" music to be performed by individual voices separately and by various noises (tone-colors?), then he should consider the greatest polyphonic work, the Well-Tempered Clavier.

From Goethe's tonal theory:

Perhaps we cannot escape from this dilemma except by an artificial process. Comparison with the tones which always progress naturally, and the equal temperament compressed into the octaves. Whereby in defiance of nature a decidedly more energetic music becomes really possible for the first time.

What then is one string or every mechanical division compared with the ear of the musician?

A FINAL OBSERVATION

We speak of tone-colors. One may ask how we obtain them. What does the expression tone-color (color of the tones, sounds) really mean? Isn't the formation of this compound based upon the idea that the sound (tone) is something which takes a color? By what means is it colored?—even by the noises lying in the physical nature of a certain instrument. They never quite escape, but arise when one produces a tone on this instrument. Besides, surely one does not need to debate that these noises are not musical. Nevertheless, I must repeat: the coloring of
the sound (tone) by them has no musical aesthetic significance—at most, an "onomatopoeia" in program-music. However, is this then still music? The remarkable thing is that others find this comprehensible when they hear the tone-color in nothing other than in those noises. So in the end, might tone-color have no musical aesthetic significance in general? Perhaps it is something quite different from those noises emanating from the body of the instrument—the body not sounding, but vibrating. What then characterizes the sound of an instrument? The prominence of a certain tone of the harmonic series—thus the interval. The tone preserves its color (coloring) thereby in that it is heard in relation to another tone; nothing is significant other than hearing a tone musically in this manner. Hearing a tone in relation to another tone requires perceiving it as an organic member of a melody (and a rhythm—here the melody contains the rhythm within itself). This, and nothing else, is the "musical intuition."

The more a composer hears his melodies on an instrument with a limited tone-color, the more the sound and tone-color nature of this instrument comes to his aid. This nature creates with music and melody what wants to be created and what lies naturally in the instrument, which contains in itself a certain, definite, but limited number of melodic
possibilities, contrary to creative hearing. The more a melody is heard creatively according to its inner nature in the totality of the tone-colors (thus not in the nature of a certain instrument), the more the musical creativity depends on the creating, and, to a certain degree, the more it is put to the test.

The atonal melody must be created wholly from "out of itself." That it can only be played on instruments with tempered tuning (piano, harmonium), however, does not have a foundation; by chance it might be a specific piano or harmonium melody—in the sense that one speaks of a violin melody. To be sure, there is no piano melody, but melodies which turn out to be musically audible on the piano (harmonium). The piano has no tone-color character as does the horn; indeed, it comprises the totality of the tone-colors, since it is certainly a tempered instrument. In order to hear the character of the piano, one must hear musically (what one most thoroughly forgot in the course of the nineteenth century through the grandiose arrangements of orchestral music). Just as the atonal melody puts the creativity of composing to the test, so its continual playing on the piano puts the musical hearing of the listener to the test. Whoever initially avoids the musical intuition can be sure to hear no music out of an atonal melody.
Only a minute distinction exists between the creative and postcreative musical intuition.

These essays are written in part with the assistance of Ferdinand Ebner.
The temperament in relation to the circle of seconds and sevenths.
Irregular distribution of the harmonic intervals within an octave.
The temperament in relation to the circle of fourths and fifths.
Characterization of the intervals.
Portrait of Josef Matthias Hauer

Manifesto of March 16, 1947

Trope table of August 11, 1948

Trope diagram in morphological arrangement

Manifesto of March 25, 1956

Trope development and melodic outline of the Twelve-tone Game for piano, four hands, of July 5, 1952, in twelve-tone notation

Twelve-tone Game from July 5, 1952 in seven-tone notation
JOSEF MATTHIAS HAUER

March 19, 1882, to September 22, 1959
I reject all my modern musical ideas of composition which I developed along the path to knowledge because I only recognize the great, complete, cosmic, eternally unchangeable, absolute music—the genuine guardian; the most holy, most spiritual, most precious in the world; the heart and understanding; the satisfactory manifestation of the world order as religion; the original language which directly increases reason; the Spirit conceiving God's Word; the art of all arts; the knowledge of all knowledges—in short, because I only recognize the twelve-tone game.

Not from the university, but through the grace of the universe.

The composer

Josef Matthias Hauer

Vienna, March 16, 1947
a) Polysymmetrical tropes

The numbering of the tropes corresponds to the Hauerian trope table of August 11, 1948.

1See page 66 for further explanation of the trope diagrams.
b) Monosymmetrical tropes
c) Endosymmetrical tropes
d) Exosymmetrical tropes
After one has learned the twelve-tone notation, composing a twelve-tone game is child's play. It is not easy to perform the game correctly (and creatively), but it is difficult to hear it—that requires education!

Josef Matthias Hauer
TWELVE-TONE GAME FOR PIANO
FOR FOUR HANDS

Josef Matthias Hauer

July 5, 1952
TWELVE-TONE GAME FOR PIANO
FOR FOUR HANDS

Transcription into Seven-tone Notation
without Pedal
CHAPTER V

Josef Matthias Hauer
Theoretical Writings

Volume I

VOM MELOS ZUR PAUKE:
EINE EINFÜHRUNG IN DIE ZWÖLFTONMUSIK

FROM MELODY TO RHYTHM
An Introduction to Twelve-tone Music

Dedicated to
Arnold Schoenberg
There are many people here who are disputing as to whether or not there is such a thing as atonal music. Well-educated minds speak of "lifeless" music, and label the Melos as a "purely mechanical product" which produces a "contradictio in adjecto"--an "absurdity." To them it is impossible not to set up a relationship between the individual tones in the perceiving mind. They term the atonal melody a "purely negative principle" with which no one can create music, and so on. In brief, these gentlemen, in their unconscious madness and desperation, write against their very selves, against their "works," while their "problems" elicit at most a sympathetic smile from a sound musician. My own friends, annoyed by these turgid and untruthful "criticisms," advise me to ward off once and for all at least a part of this plague by an open and clear discussion. To be sure, I am convinced that one can accomplish nothing at all with words and that those who can hear no melodies will not become musical through good "argumentations." However, this discourse might give some initial interest in twelve-tone music to some untainted musicians who have discovered it through my stammering schoolmaster German. I will venture this as a possibility
as I discuss this craft. At the beginning of each paragraph, I will pose the questions with which my highly respected fellow men again and again harrass me. I entreat my most highly revered readers to grant me mercy from their destructive discussions, ironic remarks, malicious distortions, false citations, senseless controversies, condescending assessments. I entreat you at least for the respect which every schoolmaster may lay claim to: namely, that he need only expound his explanations once and for all—not continuously—which is analogous to teaching the multiplication tables in high school.
DOES PURELY TONAL MUSIC EXIST?

To this question each negro of a jazz band can answer quickly and conclusively. Using any "sound" whatsoever, he boxes, stamps, and drums around—thus producing purely tonal music. Children, too, carry on the same way, and since we adults are childlike or childish now and then, drumming around on a tone very often gives us joy. Then we live out our moods, emotional states, our ideas, our personal rhythms, while we ourselves swing to one tone for a long time—just as a sloth clings to a branch. Purely tonal music is a delight, a vent for highly-spirited beings, and I can see quite well how a modern composer consents to assemble various percussion instruments in order to let the drum beat afterwards in various and complicated rhythms. The writing down of such percussion orgies is "child's play," but its execution should occasionally be very difficult, so that the composer can show his virtuosity. To the public, however, this has a barbaric and wild effect; this sensual charm, which corresponds to pepper and paprika in the culinary art, signifies the same in the scope of all music. When the seasoning in food is not too strongly noticeable or if the soup is not over-salted, then there is really nothing that one can find fault with in that. To be sure, not everyone derives pleasure from eating only paprika and pepper. It is also true in
music that there are those to whom the eternal drumming on a single tone becomes annoying and "monotonous" and who then long for a second or third tone, or even a melody—something melodious.

WHAT DO YOU MEAN BY "MELODY"?

Now I am in a fix, for I don't know a definition of the concept, "melody." Knut Hamsun speaks very cleverly of the melody in the flight of the vulture, of the melody in the arrangement of the boughs and twigs of a tree, of the melody of a waterfall, and in this sense we can also speak of the melody of the above-mentioned swinging sloth. However, I should not approach my philosophically-minded readers with poetic things, which they understand better than I—who can only hear or approximately sing a melody. Indeed, the manifold arrangement and row-succession of various pitches do not yet constitute a melody, but are the prerequisite of the melodic in music. An ordinary mortal with good common sense does not speak of a tone as a melody, even though it exhibits the most interesting drum beat; on the contrary, he calls the purely rhythmic noise "unmelodic."

Melody is a lucky amalgamation of the rhythmic with the melodic. At least two different pitches are necessary to be melodic. It is often very interesting to observe the melodic process of development among small children. At first,
in the purely rhythmical phase, they tap on objects, always singing one and the same tone. One day, however, there is a change, and the melodic appears.

The way my children began to sing melodies is one of the most beautiful memories of my life. In the case of my elder daughter it was especially quite noticeable. After singing on only one tone for a long time, she suddenly began to sing her first spontaneous melody:

Later, a scholar explained to me that the war song or battle howl of certain Indian tribes is said to sound quite similar. From the lofty standpoint of art music, we earthly sons know how to speak of the birth of the original melody (tonic-dominant-tonic) and to account for the appearance of a certain fundamental tone with the gradual unfolding of the individual partials. Out of that tone the melodic in men develops quite naturally. In the case of my children, this came quickly—as soon as they had luckily found the first tone of the harmonic series. The melodic development within man is crucial for the degree and height of his musicality. Most men scarcely rise beyond the purely animal-like, physiological stage in their melodic development; such noise
fanatics, through misfortune, will often turn out to be composers who have an unlucky love for music. The outermost boundaries of purely melodic listening are the twelve tones of the complete circles of fifths and fourths of the equal temperament. The 479,001,600 combinations of these twelve tones contain an incalculable body of magnificent melodies and timbres, of musically logical harmonies and polyphonies . . . . This occurs, however, only when a musician hears them, when he inhales their breath, when he molds them musically, when he can interpret them. However, for the "circus horse" with its purely rhythmical drum-noise sensitivity—for the "dancing-animal"—there remain these combinations and permutations, these arithmetic possibilities, these constructions . . . for the unmelodic and only half-melodically developed people, they remain always and forever a scheme, a routine, negative, incoherent, an arbitrary and optional row-succession of tones, a "nothing."

DOES PURELY ATONAL MUSIC EXIST?

Yes, indeed; just as we have found the purely tonal as well as the purely rhythmical pole of music above, by using the same logic we will also find the opposite—the purely atonal, the purely melodic pole of music. Musical experience and occurrence we term "Melos"—the distance between tones of various heights; notice that the experience, the occurrence, and the distances take place within us. Melos
is an absolutely spiritual, musical process in musical beings. The various pitches are only the physical and physiological provision for this experience; the tones are soil, while timbre is matter. To have a purely melodic experience in music, we must reverse, or eliminate naturally the purely rhythmical noise factors as much as possible. Various strong and various long tones are not equal-tempered; they arise from various noises and perhaps still do not spread uniformly within the octave (that most powerful support of the hearing) and within the circle. In the case of such suppositions, the purely melodic span, the balance, as well as the purely melodic experience will be difficult for the listener to comprehend, if at all. "A"-tonal music is also "a"-rhythmical; we must speak strictly neither of a purely tonal nor of a purely atonal music, but only of the two poles of music. On one side of the pole only rhythm is found, while on the other side is only Melos. If one side is only seasoning—only physical attraction—then the other side is only pure food without seasoning. At neither pole can we exist continuously! To which civilized man will it occur to drum endlessly on one tone? To which warm-blooded musician, however, will it occur, on the other hand, to play or sing endlessly the twelve equal-tempered tones monophonically, without accentuation, each equally long and loud, in order to play purely atonal music? In that icy
wilderness at the two poles no man can endure indefinitely. However,—and now comes that which my enemies do not wish to understand—the longer sojourn in these airy spheres, in this height, produces cleansing and clearing up. More especially, the sojourn at the melodic pole of music is an exercise, a strengthening in musical virtue. A musician, who continually practices singing one-line melodies of the twelve well-tempered tones, removes himself far away from the banal, trivial, and from false sentimentality. For all time he has escaped these dangers in order to enjoy life to the full—in that which is personal, rhythmical; in ideas, in moods, in harmony and polyphony.

WHY DO YOU TERM YOUR MUSIC ATONAL?

I begin my compositions from the atonal, melodic pole of music, and move toward the tonal, rhythmical pole in the course of the work. Actually, my music is located in the middle between the two poles; it can be spoken of as neither purely atonal nor as purely tonal. Since I start from the atonal, purely melodic experience of the twelve tones, and only touch upon the other hemisphere, I correctly term my music "atonal," or "melodic."

HOW DOES YOUR CREATIVITY FIT IN WITH THE WORK?

Having sung twelve-tone melodies from my youth up, it only occurred to me lately that all, or almost all, tones of the circle were contained in these melodies. My melodic
development was already far advanced in early youth. Through education and instruction, however, this "folly" was overwhelmed. Not until later did the melodies, well-preserved and fostered in my inner self, burst forth; since then, they sing within me incessantly. What matters is that I find a good (or the best) conceivable form for my obvious musical experiences so that others can also participate thereby. Form is the courtesy of the artist with respect to the public. Because of the form and because of the craft, he struggles perpetually, and I have truly omitted nothing in this connection.

**HOW DO YOU USUALLY BEGIN YOUR COMPOSITIONS?**

One fundamental melodic idea, one basic melodic figure was, and always is, the starting-point of my forms. The fundamental melodic idea, the basic melodic figure, is, however, generally not to be mistaken for a theme or leit-motiv. It could be briefly defined as a "melodic nucleus," but even this is not correct, for the melodies emanate first from the fundamental melodic ideas, just as the harmonies and the polyphony do. At best, I will demonstrate it by a single example, which by no means exhausts the possibilities: in the spring of this year, the Austrian countryside did it to me again. While I was staying at Traunsee during the Easter holidays, it did not rain once during those beautiful days. The Traunstein, the lake, the meadows--all had
conspired against the "absolute" musician. At that time I thought to myself: now if I could just find the correct basic melodic figure—the appropriate "trope"—then the construction of a Romantic Fantasie for Orchestra (without a program!) would merely be a matter of musical technique. Soon afterwards I discovered it, and within eighteen days this Opus 37 was quite ready on paper. However, I must mention something now which perhaps will cause many to wonder. In due course, I arranged and organized the melodic possibilities of the twelve tones into forty-four tropes; after years of practice I know quite well what's what in these changes and how others find their way about easily in the keys and modulations. Fundamentally it is the same, only incomparably complicated. In the course of time, I have become particularly acquainted with the **content of the mood** of these changes which has proved useful to me in formal construction. Earlier composers had to make decisions concerning close- and near-related keys; today, however, that is improved through the use of tropes. The study of theme technique in twelve-tone music is very similar to that of harmony and counterpoint; the difference lies only in the greater possibilities, in the finer ramifications and branchings. The total theme technique of twelve-tone music
clings to the theory of the tropes, a theory requiring intensive study.

IS YOUR TONE-SYSTEM ALREADY COMPLETED AND CAN ONE LEARN IT ACCORDING TO RULE?

One musician alone cannot fully complete the twelve-tone system. To that end several more composers and several more centuries will be necessary. Certainly the positive aspects, carried out in the field up until now, can be learned according to rule—though naturally neither in a week nor in a month—and quite certainly can be logically and correctly built further on this basis, on this solid foundation. The learning of the tropes, of the manifold melodic changes, is bound to the personal application of the individual, to his intellectual grasp; this is analogous to the learning of harmony and counterpoint. The working out of many, many examples is the means to that end. By means of the following trope table, I will explain the system. (See below.)
Trope Table:

1. [Musical notation]
2. [Musical notation]
3. [Musical notation]
4. [Musical notation]
5. [Musical notation]
6. [Musical notation]
7. [Musical notation]
8. [Musical notation]
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23. [Musical notation]
24. [Musical notation]
25. [Musical notation]
26. [Musical notation]
27. [Musical notation]
28. [Musical notation]
29. [Musical notation]
30. [Musical notation]
31. [Musical notation]
32. [Musical notation]
33. [Musical notation]
34. [Musical notation]
35. [Musical notation]
36. [Musical notation]
37. [Musical notation]
38. [Musical notation]
39. [Musical notation]
40. [Musical notation]
41. [Musical notation]
42. [Musical notation]
43. [Musical notation]
44. [Musical notation]
Each of the 479,001,600 melody-rows is divided by a barline into two halves, each of which includes six tones. The tones of one half are related to each other and to the tones of the other half in quite precise interval-relationships. From this standpoint, if we combine groups out of those melody-rows whose interval relationships are the same, then we obtain forty-four such possibilities—therefore forty-four tropes. For example, the characteristic figure of the first trope is the chromatic scale. I want to call attention to the fact that the transposition of the scale into the twelve pitch ranges has no decisive significance for the melodic or for the interval relationships. If we take into account the transpositions as well, then we have twelve times 479,001,600 permutations. In my trope table, "a" is the lowest, and "g-sharp" the highest tone. Now take the following into consideration: in the left half of the trope the tones are arranged from "a" to "d" and in the right from "d-sharp" to "g-sharp." Both halves occupy the space of two joined fourths, which, when combined, form a major seventh. Through permutations in each half, you will obtain 720 times 720—or 518,400 combinations—one of which appears as follows:

\[ \text{Kit gelben Blumen fangst und voll mit wilden Rosen.} \]
In addition, each of the twelve tone-modes has 518,400 combinations, or 6,220,800 possibilities altogether. In the case of most tropes, both halves may be rearranged so that the first may exchange places with the second, and conversely, the second with the first, whereby other combinations arise which double the number of possibilities within a trope from 6,220,800 to 12,441,600. In only a few of the tropes do the same interval relationships appear in connection with the exchange of both halves; therefore these are termed symmetrical \(\text{widergleich}\) tropes. Altogether there are eight tropes which fall into this category: the first, eighth, seventeenth, nineteenth, twenty-fourth, thirty-fourth, forty-first, and forty-fourth. Finally, in most of the tropes, twelve various melody-groups result from the inversions in the twelve tone-modes. Only a few form an exception: the eighth trope has only six tone-modes with various groups; the thirty-fourth trope has only four various tone-modes, the forty-fourth only two and the two.
inversions (of halves) of the thirty-eighth trope have six various tone-modes at a time. With this, I have said everything which is absolutely necessary for an introduction to the twelve-tone system; now an average mathematician can easily prove with regard to all trope details whether the 479,001,600 melodic possibilities of the twelve tones prove correct. Moreover, I will assist further by revealing that in twelve-tone music there are eighty various six-tone-chords and 924 tone-modes. However, even having obtained the knowledge of these numbers, one is certainly not guaranteed to be able to compose. In order to be able to make the most of the tropes properly (as in the case of modulations earlier), the musical, conscious working out of examples is necessary. The musical imagination must be at work together with the system—corresponding to the coordination of hand and foot (as with the seven tones earlier)—so that an orderly, respectable music appears.

WHEREIN LIES THE IMPORTANCE OF YOUR WORKING-METHOD?

Once I have decided on a trope—on a subdivision—then I proceed as did the contrapuntalist of old—with his variations, imitations, canons, interweaving, contrasting voices, displacement, clusters, inversions, augmentation, diminution, stretto—briefly, with all the possible means of construction. To be sure, all these geometrical and constructive tools have no significance in the purely musical life of man; at the same time the details are of little
importance to the musical layman. To him, it is mainly a question of the music. The composer, however, must pursue with great diversity a crystal clear formal construction with similarities, relationships, and repetitions, since he thereby directly and significantly facilitates the listening of his music. With the Romantic Fantasie I had to create a wide base corresponding to its length (it is written in one movement). The fundamental concept, which emanates from the twenty-fourth trope (see the trope-table), becomes five other tropes through transpositions of various kinds. This produces the following outline:
In addition, the inversions of each one of the twenty-four cases may be added to these possibilities, so that, on the whole, twenty-four times twelve, or 288, "building-stones" are formed. These are closely related to one another and are distributed so that they are maintained reciprocally in balance. The great care which I bestow upon the equilibrium rewards the hearer, for it is by this means that the "hearing" is significantly and directly facilitated. And now the real work begins—the interpreting, the "hewing" of the building-stone, which goes hand in hand with the assembling, or "composing." By means of the outline I have only set the limits within which I can make music to my heart's content. It will not be difficult for a musician to discover the melodic axes, the cadentially harmonic and polyphonic changes. Naturally, the arrangement of the building-stones in the outline signifies nothing concerning the act of composing itself.

HAVE CERTAIN RULES RESULTED FROM THE APPLICATION ON THE BUILDING-STONES?

I don't know what one may term that which I will now point out. In any case, in connection with each building-stone, with each trope, there are certain peculiarities which become rooted in the equilibrium, and over which one may not pass with impunity. In the following which is taken once more from my Opus 37, I can only demonstrate some examples. As I have already stated above, for a long time I
sang monophonic twelve-tone melodies which resulted in almost purely atonal music. The first step toward an "improvement" was the addition of a homophonic accompaniment to the melody. Purely and simply my ear was the controlling factor. I have become so fond of this primitive or "neo-primitive" style that even now I willingly use it, although I have already learned some altogether different things directly through its use.

Another technique, the suspension of the melody-tones, followed on its heels. Thereby the first step toward polyphony was made. In my poor musical estimation, this style still has its charms for me. I even believe that the syncopating and working out of the voices borders somewhat on art.
I am not only a "neo-primitive," but also an "old-fashioned" man, who loves melismas, ornamentations, figurations, runs, virtuosic passages, and (oh, horror!) even natural events (rain-showers, bird-songs, . . . )—naturally carried out within the framework of the musical. It will not be difficult for the reader who is actually interested in the subject to establish the relationship of the detached stages to the building-stones of the outline. In those purely musical forms which are constructed as strictly as are fugues, it is to be hoped that one may permit the musician to have a say and here and there to "program" a little also.
In addition, the bass is important in twelve-tone passages:

I have not yet broken myself from composing monophonic music. In the following example, a monophonic twelve-tone melody (may I say melody?) in the bass is taken over and performed by the woodwinds in four voices, during which the keyboard performs a rippling celesta imitation. The scene represents a "primitive," natural occurrence—the echo—or, if we want to remain strictly musical, the singing of a "one-voice fugue."
For all that, the "echo"--in musical terms, the *canon* (twelve-tonal)--may be used to produce a substantial transition to a new scene. Generally, the "greater," or complicated, polyphony is very well suited for climaxes and the like.
In connection with the last example, the twelve-tonal complexes above are indicated by brackets, the balance; and this equilibrium, as is well known, is the secret of the "hearing"—not physically, but spiritually musical. I emphasize this lest the old contrapuntalists form the notion that one might break the old rules simply at the pleasure of twelve-tone construction. The twelve-tone law—so I term it, not without reason!—the law of the twelve-tones must somehow always be kept! I have erected forms with twelve subdivisions of five, or else seven or eleven building-stones (five times twelve, seven times twelve, or eleven times twelve), so that the circle again closes; it sounds excellent. In other respects, I adhere to the rules of the old counterpoint so far as it is possible under the given
circumstances, for I am convinced that our polyphonic hearing is no longer standardized according to Palestrina, but to Bach.

In purely harmonic passages the balance principle must also be observed. The preceding passage is the beginning of the Romantic Fantasie, and is taken from the twenty-fourth trope. The entire building-stone emanates from two six-note chords which are performed with small figurations above them. In these figures there appears a seventh tone ("e" on one side, and "a-sharp" on the other) which naturally must be taken alternately from the opposite side. The one who doesn't observe this balance is a layman, since he is made insecure, no matter what. The critics, however, always want to correct the melody and talk foolishly of sequences, since they as yet do not know that there are symmetrical tropes. If we had nothing other than the twelve well-tempered tones in the world, then we would have to
believe in the wise Creator who has set the world up according to a great design. And, if there is something which foreshadows this one plan, it is the Melos of these twelve tones. If, however, a composer perpetually and stubbornly violates the melodic equilibrium laws, then it is as if he were hitting his head obstinately against a stone wall. The wall does not give way; instead, his skull is broken. If a masterbuilder does not observe the laws of balance, then his house falls down and people are buried within. In music, the danger, for the moment at least, is not so great, but in its enduring effect it is actually yet much greater. That a great number of modern composers are not confused, or have already been confused, proves only that they are merely unmusical or melodically immature. The masterbuilder is very careful about learning the laws of balance, since it is a question of men's lives! The musicians, however, have organized musicians' festivals with loudly "collapsing houses," and look!—not once are the composers terrified because of it. That is a poor sign of their musicality, especially when one knows how they are working and what they accomplish by their noise-making. A university professor has demonstrated to his students my twelve-tone music, in which he simply sits down on the keyboard of the piano, and then declares: "This is the substance of Hauer's music." If the man only had a presentiment, only a faint, mere,
presentiment, of how right, how so absolutely right he was! However, he should accuse our Lord God and leave me alone!

Did I create the twelve well-tempered tones? Am I helping so many thousands to make music with twelve tones? Yes, it is very easy for a university professor to make a tasteless and long familiar joke in front of his students. In my opinion, it would be more worthwhile if such a gentlemen accomplished a really scientific work. He could become engrossed in the tropes, or in the *Melopoeid* [Aristophanes: Theory of Music]. For us "idiots" he could decrease the work, which in his opinion we do not understand, so that we could pursue our calling, our difficult calling, for which we must bleed to death unrecognized and without reward, merely for the reason that we want to be recognized as human beings. The Melos of the twelve tones can only be dangerous to the beings who are completely developed, musically and melodically. In the case of an ignoramus, it is really the same whether he seats himself on the keyboard or drums around frantically on an instrument in some way. In contrast to the university professor, there are also men (God be thanked!) who term twelve-tone music beautiful, and who then correct themselves to say: "It is not only wonderful, but also pure, chaste, and holy."

Also concerning these remarks, I could quote authorities, authorities from old, world-famous universities. I am a man who highly esteems a scholar, a doctor, a teacher, a judge,
a priest—I respect them for whatever they want to be, I
do not dare interrupt scientific things. If scholarship
concerning twelve-tone music (not mine, but twelve-tone
music in general) is taken seriously, then I will keep my
mouth shut and only converse in tones. For the present,
however, I am constrained to preserve the common good, a
culture benevolent for mankind in better times. In connec-
tion with my imperfect education, this is the one difficult
task, and I wait quite impatiently for an academically-
trained redeemer. For the present, however, the scholar
mixes up my holy cause with my own disagreeable personal-
ity. Fanatic, dreamer, they call me disdainfully and
scornfully.

DO YOU WANT TO ELIMINATE THAT WHICH IS SHARPLY EMPHASIZED
RHYTHMICALLY AS WELL AS THE OVERALL EFFECT FROM MUSIC
BECAUSE OF THE BALANCE?

The equilibrium—the balance possibilities of the
twelve tones—are so enormous, so incalculably great and
manifold, that all we "little men" have room together there-
in with all of our "effects" and "demons." There is always
a solution for the one who still has his five senses intact
and who doesn't want to exist outside of the world (in the
lunatic house). Our modern audience demands that composers
should commit "harakiri" with each work. However, the
artists are clever enough only to get upset over it and
subsequently go to the pleasant German card game of skat
Drumming and swinging, boxing and shadow-boxing are cheap and healthy amusements. Amusement may also be had naturally within the twelve tones without destroying their balance, so that nothing more than a confused noise is generally heard—no music, no Melos—but, without broken teeth, eyes, or other injuries. The following example from my [Romantic Fantasie] is a passage whose rhythm is strongly emphasized. Its melodic balance is determined by the final three pianissimo chords which reproduce the melodic subject as an "echo."

As previously stated, a royal entertainment is the swinging, drumming, trilling, or arpeggiating of a pair of tones, which, although they arouse "feelings" in us, yet should not be cheap. The following example shows how such a passage can be kept in balance, in "restraint." The cello (the instrument of the romantics) plays a twelve-tone melody. The bass sustains the basic tones. Composing
correct basses in twelve-tone music is still more difficult than using the seven tones of earlier times. However, composing a false bass has become child's play. Our public is still temporarily harmless enough to take the composing of false basses for a "joke." Flute, clarinet, and piano trill above, using four- or eight-tone chords. The entire trill episode is played in synchronization with the cello melody so that in the first half of the building-stone, the first and second four-tone-chords resound in tremolo, while in the second half, the second and third four-tone-chords resound. Each building-stone has its "medial line" from which it is "weighed out" backwards and forwards: Aufgesang-Abgesang; inhaling-exhaling, ancient and well-known data! Each building-stone is thus a small, self-contained piece of music--a cell in a corporal organ; and from the organs, the body is built.
WHY DO YOU WRITE FOR ORCHESTRA WHEN YOU, YOURSELF, SAY THAT PURELY ATONAL MUSIC CAN BE PLAYED ONLY ON AN ATONAL, WELL-TEMPERED INSTRUMENT?

I have explained above that there is no purely atonal music, since it would be monophonic and a-rhythmic; however, both rhythm and melos belong to a real, concrete melody, out of which harmony and polyphony are produced in the course of the development. Nevertheless, I prefer that the orchestra be tempered and played in tune as much as possible.

There should be no separation or clarification of "f-sharp"
and "g-flat" by the strings; the brass instruments should have the correct valves! The woodwinds, on the other hand, are almost equal-tempered. Our musicians already learned long ago to play with twelve tones; they were forced to that end. Also, the instruments could still be improved. The scoring of twelve-tone music is not difficult and necessitates only practice and consideration. The ear, the ear, and, again, the ear, is the best teacher. In the orchestra there are also tympani, drums and other noise-instruments. I have already begun to use the tympani, since they are tunable. To be sure, I use them sparingly, but do not deal with them slightly.

Vienna, July 1925.
CHAPTER VI

Josef Matthias Hauer
Theoretical Writings

Volume II

ZWÖLFTONTECHNIK:
DIE LEHRE VON DEN TROPEN

TWELVE-TONE TECHNIQUE
The Theory of the Tropes

Dedicated to
Hermann Heiss
Without being a continuation of the first volume, this book presupposes the knowledge of what was expounded in Volume I, *Vom Melos zur Pauke*. This book is written not for musicologists, not for performing musicians, and also not for amateur musicians, but primarily for composers of twelve-tone music. No "rules" and "conventions" have been laid down here; instead, I have only presented laws discovered in connection with my creative work which appear absolutely necessary for the "twelve-tone composer" to use.

In this book I have not set forth my proposition in the sense of a harmonic theory to prove the tonal application of the twelve tones, the composing of basses, and such like, but simply to give a practical introduction to the architecture of the "twelve-tone" structures. This book has been kept to the most concise form, so that the study of the many notational examples, which explain the most important things mentioned here, should make a greater amount of the following explanations unnecessary.

J. M. H.
A notational system is necessary for a basic study of the composition technique of twelve-tone music; the twelve tones are arranged distinctly and discernibly into equal intervals, so that one can read over the melodic movement quickly and surely. Therefore the notes for the twelve tones must be arranged as follows:

![Diagram of twelve-tone notation]

The system of lines, which this arrangement makes possible, is in and of itself of little significance. However, the arrangement of the piano keyboard with respect to the twelve tones is easily seen here.

![Diagram of piano keyboard]

The line notes designate the tones of the black keys while the space notes those of the white keys. The octaves are differentiated by clefs and by the octava-sign in the
case of very high or very low tones. The treble clef designates $g$-sharp\(^1\) or $a$-flat\(^1\), the alto clef $d$\(^1\), and the bass clef $g$-sharp or $a$-flat. Otherwise, everything remains the same as in the traditional notation.

This twelve-tone notation is a "short-hand" which significantly facilitates the learning of the twelve-tone technique. Frankly, it is absolutely necessary for the understanding of the twelve-tone building-stones. Obviously it could be used with all instruments, scores, and so forth. However, even the reading and writing of the old seven-tone staff can be simplified if one observes the following rule: the accidentals are always valid within the barlines, but only for the notes before which they stand.

The twelve-tone notation has been of the greatest service to me in finding the tropes. Otherwise, the
consideration of the 479,001,600 melodic possibilities would not have been possible. However, using the twelve-tone notation, it is easy to obtain an exact view or summary of the different interval relations, since they are visible. One can grasp the changes at a glance, and the result thereof is a fast and sure working process.

In the twelve appended tables, I have written down all twelve pitch transpositions of the tropes which include all conceivable melodic possibilities. Accordingly, it must be possible to trace back to one of the fixed tropes each and every twelve-tone melody:

```
Sich! Dein liebes, Na-tur, lei-det und schlaid, und du...
```

This melody is written in the twelve-tone notation below; next to it is the trope formation. Notice that in one half of the trope there are two fourths moving in half steps which are in fixed interval relationships to the diminished fifth, d to a-flat. In the other half of the trope, two minor thirds move in half steps, which again are in certain
interval relationships to the major second, d-flat to e-flat. The mutual position of the intervals in both halves is also of significance.

We do not have to search long to find on Table IV the thirty-first trope, in which the interval relationships as well as the compass are the same as above. Therefore we say that this melody is in the thirty-first trope (similarly as one said in earlier times, a melody is in a certain key).

Only through the study of the tropes does one realize the worth of their melodic and harmonic characteristics, which have a determining significance in the twelve-tone technique. This does not depend on the memorization of the forty-four tropes with their numbers, but on remembering the trope-formations. Thus one is able to recognize them quickly and certainly in each and every melodic case as well as being able to work freely and systematically.

In the following example, I have copied down the above melody twice, and have revealed its "phases" through displacements. Under it I have written down the trope-formations which belong to the phases and which can be
looked up in the tables. The sixth phase of the melody is again found in the thirty-first trope with which we began. Notice that the whole twelve-tone melody moves about in six tropes. I must enlarge on the foregoing by saying that this melody is in the thirty-first trope to which (in this case!) the fortieth, second, fifth, fifteenth, and thirty-fifth trope are melodically connected. Among certain melodic constellations two or more phases may occur in the same trope; but, at the most, each twelve-tone melody with its phases moves within six tropes. Also, the proportions (tropes) are naturally the same if the melody is sung in retrograde, and, obviously, if it is transposed to the twelve pitches as well as if it is used with all inversions (tonal families).

From these unshakable truths mentioned here the composer can derive devices and craftsmanship which should enable him to work easier and freer, so that he can direct his
special attention to the purely musical—the music itself. No "rules" and "conventions" should be set up here. I, who have been against prejudices and narrow-mindedness all my life, having had to suffer severely under it, will certainly not make the mistake of creating hindering regulations which will later lend themselves to mere shop talk. However, I have always had the greatest respect for real and honest laws.

In music there are two great laws which I will explain allegorically with the technique of bridge-building. A structural engineer is mainly concerned with two forms of energy: on the one hand, the weight of the material; on the other, with its strength and structure. The infinite possibilities of the reciprocal penetration of these two energies stipulate the building method. With stone bridges, for example, he must concentrate more on the problem of weight; he must use a large number of very strong piers, because he can only reckon with comparatively small spans of an arch. However, if he uses concrete or even steel, he can achieve far greater spans using fewer and more slender piers. The same is true of music. We find the principle of gravity in a given note with its series of harmonics. The principle of large spans may also be found in the closed circle of twelve notes, in the twelve-tone law. Both these principles must be respected under all circumstances, yet in an infinite
number of variants. Both "energies" penetrate each other and keep themselves in the balance. Practically speaking: if a composer disturbs the "steel" bracings of the twelve tones and their balance by "burdening" single tones--i.e., emphasizing them rhythmically, "loading" them through emphasis and the like--he slips back into the law of harmonics; he must become tonal, he must yield to "gravity" and place a strong "pillar," a basic tone, a matching bass, that carries the "stress." In such a situation one always finds basses in fifths in my compositions, with the basic tone reinforced by means of octaves--consequently, strictly according to the pattern of the harmonic series. If, however, the tensions and bracings of the twelve tones (as in the case of a steel girder construction) are finely adjusted, thus atonally corresponding to the twelve-tone law, then individual tones may not be encumbered.

Now I have come to the focal point of my exposition. My task does not consist of demonstrating the tonal use of the twelve tones, the composing of basses and the like. That others have done for me exhaustively, or almost so. I refer to the many theories of harmony, in which every conceivable case of the "vertical," or the "stone-bridge construction," is taken into consideration. Rather, my task is to give a practical introduction to the horizontal bracing of the twelve tones, the "steel-bridge construction."
I am forced to write a new theory of counterpoint. The old counterpoint theory is not completely overthrown or discarded by my practical instruction of the twelve-tone technique, but it is made stricter and improved therein. My instructions should demonstrate how one can manipulate the counterpoint of twelve-tone technique easily and facilely.

I have discovered two ways with which one can quickly attain the goal and which include all that is necessary for the process; I designate them the "canon-technique" and "obstinate" counterpoint. Before we look into the matter itself, I want to point out several general aspects of the structural melodic voice leading which I depend on.

My primary principle in counterpoint is, naturally, note-against-note, or oblique motion. I avoid parallels wherever possible. If I must use parallels, however, then I prefer parallel thirds, sixths, or diminished fifths (augmented fourths), which tinkle exquisitely in twelve-tone music. I have not yet found hidden parallels to be bad in twelve-tone music. The octave is completely eliminated as a building resource, nor may it be permitted to break into a purely polyphonic composition of twelve-tone music as a perfect octave or perfect prime. Quite automatically it results from the twelve-tone law and the "law of stresses" of individual tones. It may appear in a "mixed technique"
and in cadences. At present, we cleave strongly to the bracing-technique of the twelve tones. Nevertheless, it is possible to double or even triple all voices in octaves, as that, in and of itself, has nothing to do with the compositional technique.

In connection with parallel motion, I observe the following:

Once more, thirds, sixths, and diminished fifths, (or, augmented fourths) are unobjectionable; I skip from the same direction to perfect fifths and fourths only if there is not another possibility. Likewise, I avoid the skip to major seconds and minor sevenths from the same direction as much as possible. If it is absolutely necessary, then I proceed with one voice by half-step, which is also a good idea for fifths and fourths:
As a rule, I avoid the skip to minor seconds and major sevenths from the same direction (naturally, only in the purely polyphonic composition!).

Now let us turn to contrary motion, to real counterpoint. One may skip to every interval (with the exception of the perfect octave and perfect prime) and to every conceivable chord from different directions in the expressed contrary motion. Since there is no more leading-tone track, there is no more stumbling block. Moreover, all chords are equal since none of them have to be discreetly handled (as, for example, the six-four chord was earlier). Also, we no longer differentiate between simple or double counterpoint, and so forth. Therefore, the "skip inward" has become easy, but the "skip outward" from all chords is more difficult. One can go wherever one wishes with each voice from the chords which contain no minor seconds and no major sevenths. However, with chords which contain minor seconds and major sevenths, I follow some old, basic principles with reference to the same tones which constitute these intervals, and which I have presented clearly in the following table:
The tones of the minor seconds and of the major sevenths "irritate" so strongly that one can soothe the ear only through the above-cited melodic steps. Also, combinations of these progressions are possible; otherwise the ear loses the melodic thread. For example:

In purely polyphonic twelve-tone music, the ending of a three-voiced composition is completed either by a major or minor triad which must somehow result out of the trope construction. The four-voiced composition may be also concluded in major or minor (by descending into
an octave in contrary motion) or concluded with one of the major or minor seventh chords, which have become completely satisfactory final chords in twelve-tone music.

Since in program music, tone-poems, tone-paintings, etc., the conclusions are more dependent on principles other than the purely musical, they will often turn out differently.

Concerning syncopation, I generally keep to the axiom that the note held over the barline should not last longer in the new measure than it lasted prior to the barline. As for the particulars, however, the following examples will demonstrate how I do it.

The canon-technique grows directly out of the tropes—that is, out of the twelve-tone complexes; therefore, the trope exists prior to the motive or theme. He who learns to master the canon-technique through exercise and practice will soon find out that by no means do the motives and themes come too quickly—such mastery is only achieved by labor. Progressive skill is necessary in order to work out certain motivic and thematic characteristics. Permit me to
mention a general rule concerning the "row-arrangement" of the tropes: similar tones should be removed as far as possible from each other. For example, if a building-stone terminates with the tones, D, F-sharp, A, B, then the next one should not begin with these tones. Only in general cases is this valid; in specific cases there will be some exceptions.

\[ \text{\textit{V 31}} \quad \text{\textit{VII 40}} \]

In the foregoing example, I notated two three-voiced canons from the thirty-first and fortieth tropes each of whose voices conclude together. The first draft, written in the twelve-tone notation, should demonstrate completely the importance of the "advantage" of the twelve-tone script as extraordinarily clear "stenography." The following is a transcription in the old seven-tone notation:
In this technique, the spans and bracings (the balance, the equilibrium) of the twelve tones are precisely apportioned and equalized. The complexes, as well as the structural melodies, are twelve-tonal. The tropes, from which the melodies come, can be located in the tables. It is always very important for the "master-music-builder" to know whither he moves in these magnificent possibilities.

The above example is composed in the same manner, only in four voices. Again, here is the transcription:
The following canon is taken from one of the three divisions of the thirty-first trope:

The four-voice canon below was also constructed by using the same fundamental melodic ideas.
I have pointed out above how that one can analyze and identify a melody in its phases, so that at least six tropes are taken into consideration simultaneously, whether the melody is sung forwards or in retrograde. Also, neither the inversion of both halves of the trope nor a transposition to other keys changes anything. The subsequent (second) canon-technique has no longer emanated from the tropes alone, but from a fundamental melodic idea within a trope which may be realized in many ways.
This technique differs from the preceding in that the placement of each new tone requires its own beat. Concerning structural melodic direction, syncopation must be considered as well as all of the principles indicated above. The cited axiom of the atonal—that a new building-stone should not begin with the final tones of the preceding one, must above all be considered. Not only does this type of canon permit broad cantilenas in slow movements, but it also produces some very interesting rhythms. The following is its transcription in the old notation.
The next three- and four-voice canons are based on the same fundamental melodic ideas as the preceding ones. They are found in the second, third, and fourth parts of the building-stone, so that various rhythms are revealed. Once more notice the syncopation, the connection of the second building-stone, and the endings in the examples.
The obstinate counterpoint is a further elaboration of the smoothly manipulated second canon technique. It emanates directly from the fundamental melodic ideas, from the basic melodic shape. The difference arises in that the voices move more vigorously—no longer vocally as in the canon-technique—but by leaps and bounds, headstrong, "obstinate."
The following are six examples of three and four voiced texture as well as of various rhythms:
Vienna, October 1925.
CHAPTER VII

MUSICAL ANALYSES AND PERFORMANCE PRACTICES

Resonances, Opus 16

Sechste Streichquartett, Opus 47

XXII Zwölftonspiel
Nachklangstudien für Klavier, Opus 16, was composed in 1919, between the writing of the treatise Über die Klangfarbe of 1918 and Vom Wesen des Musikalischen of 1920 and 1923. It is dedicated to Anna Höllering, an actress and friend of the painter Itten, and was originally published in Hauer's new notation. Concerning the performance of this work Hauer once said:

This study may only be, as it were, breathed over the strings, when it is played correctly; one must forget that the piano has a hammer-action.¹

Only these early pieces are given tempo markings. In later works Hauer stated that the interpretation should be left to the musicality of the performer. All of Hauer's works bear the instruction: "Accidentals refer always even within the measure, only to notes before which they are placed."

The three short pieces, Nos. 1, 2, and 5, taken from this work display a diversity of compositional techniques. The first piece is indicative of Hauer's early but life-long preference for monophony. It consists of seventeen measures built entirely on one hexachord or six-note pattern: A, C, C-sharp, E-sharp, E, G-sharp. Tonal repetition is freely treated, as may be seen in measure two and in measure four,

where the repeated e is used as a foil for the descending hexachord. This sort of repetition as well as the exchange of row-tones was never completely avoided throughout Hauer's entire compositional output. (Ex. 22)

Ex. 22. J. M. Hauer, Nachklangstudien für Klavier, Opus 16, No. 1, mm. 1-3.

The hexachord is repeated three times in measure one, with each statement an octave higher. Measure three presents the hexachord in retrograde in a descending arpeggio. A brief "echo" follows and in measure nine, the hexachord ascends once more in arpeggiated fashion, but this time with a displacement of the row-tones—the last tone is in first place. Permutation appears here in its earliest form, but later on was used consistently by Hauer, especially in his second period of composition (see the Hölderlin-Cantatas of 1927 to 1934). In the serial compositions of his later years, the Austrian composer Ernst Krenek used a similar method, which he termed the rotation-principle.2 (Ex. 23)

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The G-sharp ending of the hexachord, acting as a leading-tone to the next hexachord, results in a definite key-feeling of A. The prominent tones of m. 8, e' to e, serve to reinforce the A tonality by functioning as a dominant. Moreover, the last measure (m. 17) contains only three tones, A'', A', and a'''.

With the fourth piece of Opus 16, we find the instruction: pendelnd, wiegend, unrhythmisch, leise [swinging, swaying, unaccented, soft], a phrase indicative of Hauer's preference for the "atonal melodic pole" above that of the "tonal, rhythmic pole." Although this piece is in the free style of Hauer's first period, (Ex. 24) the longer values of mm. 10-20 point toward the "sustained-note style" of the later period. (Ex. 25) Consisting of only eight notes throughout (G-sharp, D-sharp, E, B, B-flat, A-flat, C-sharp, and G) the piece opens with a hexachord based on the initial order; this series of notes is never repeated in its entirety.
The free voicing of the second part in mm. 6-8 is typical of Hauer's style throughout his works. The use of rests, or in some measures, silence, does not appear to be a characteristic of his style.\(^3\) It will be noticed, for example, in the \textit{String Quartet}, Opus 47, that all of the instruments play continuously throughout.

\(^3\)The rests in \textit{Nachklangstudien}, Opus 16, No. 5, may be editorial.
The fifth piece of Opus 16 is the most clearly tonal (or modal) of the three under consideration. The four notes of measure one, B, D-sharp, E, and G-sharp, are found in the key of E major, while measures two through four display the whole-step and half-step patterns of the Phrygian mode on E.


The two main cadences in this tiny bipartite piece are both on E (mm. 7-8 and 15). The first is approached by the use of a bass pattern E-B-E which gives a definite dominant-tonic feeling in spite of the E-flat that appears in the other voice. The second, final cadence is emphasized by the repeated E in the upper part.

With the exception of C-sharp and D, all of the chromatic tones of the scale are eventually employed. The thematic motive, however, consists of eight of the remaining pitches (B, D-sharp, E, G-sharp, A, F, C, and G) and only later in the piece do the other two appear. This eight-note pattern is freely "paraphrased" throughout. Measures thirteen and fourteen are a free inversion of measure five. (Ex. 27)
Ex. 27. J. M. Hauer, Nachklangstudien für Klavier, Opus 16, No. 5, mm. 5, 13-15.

The binary form and the instructions for a "hopping, moderate motion" are somewhat reminiscent of early German dances from the Renaissance and early Baroque periods.

Period II. Conscious Use of the Twelve-tone Law

Hauer's second creative period began in 1919 with Opus 19. In 1921 he discovered the forty-four tropes, in which he employed the twelve-tone law consciously for the first time. Throughout his first period he had stated emphatically that his atonal music could only be performed on equal-tempered instruments. In the second (circa 1924), however, he began composing for chamber music and orchestra. His early conception of a "chamber orchestra" encompassed only a piano and three harmoniums. The division of the parts was relinquished to the performers, thus creating a certain improvisatorial factor:
My musical works can be performed exclusively only on instruments in the tempered tuning (piano, harmonium . . . ) and by the human voice. The tone of the harmonium should be suited to the piano tone as much as possible; the expression must be delicate. The harmoniums should support the pedal action of the piano. The performers must adjust themselves according to the execution of the piano. The piano may never be missing, while the harmonium is to be used as often as possible. Only idiomatic piano passages (arpeggios, etc.) are to be performed piano solo.

It is left up to the players to arrange the phrasing according to the agogic and dynamic shadings for the individual harmoniums. Where possible, the piano should be played with two hands, and only where two hands do not suffice, should a second player enter on the left, to help out with the bass part. The 'chamber orchestra' is obviously suited only for intimate effects in small rooms. For large effects and the like, my music is not generally aimed.

In the following introduction, which Hauer wrote to the Siebente Suite für Orchester, Opus 48 of 1926, he gives a vital insight into the performance of this and other instrumental works of his second period:

In a performance, the individual choirs must work together well; trumpets and oboes alone, then horns and bass clarinets as a choir; then further, the string quartet. Also, the entire percussion section is thought of as a choir and should work as such, wherefore a special rehearsal may be profitable. All choirs together must strictly follow the piano, which holds the 'red thread' of the work. The piano must also be placed in the middle of the orchestra for this reason, just as I have marked it in the score. The main consideration in performance is the purity of the intonation; the players must adjust their unequally-tempered instruments to the equal-tempered tuning of the piano as much as possible, since instead of four different tones performed together, many more will sound, and thereby an understanding and 'hearing' of the work is impossible.

I have written no dynamics in the score, since the music must always be played in a medium intensity (mp), and in strict time. Only the dynamic shadings of the individual melodies, which result quite naturally out of the phrasing, are of importance. The desired monotony in this suite should be useful for 'melodic hearing.'

In 1928 Universal Edition published Hauer's Sechste Suite für Orchester, Opus 47, dedicated to Erwin Lange. Two years earlier Hauer had composed the score for string quartet, and had dedicated it to Gottfried Köchert. Both the Suite and the Quartet retain the same opus number. In the orchestral suite the flute and piccolo generally perform the part of the first violin, while bassoon, contrabassoon, and contrabass play the cello part. This work is undoubtedly one of the most rhythmically interesting of all of Hauer's compositions. Indeed, the tempo indication at the beginning of the first movement, "Die im Jazzschritt (nicht schnell)," is indicative of the jazz rhythms which pervade the entire piece. We shall look in detail at only the first movement, but it is worth noting that of the four movements, all—with the possible exception of the second movement—are related to the dance or march.

The first movement is not conceived in the Classical sonata allegro form. Rather, the work is polyphonic, and the pattern of trope repetition is reminiscent of the construction of a passacaglia. The trope which Hauer utilizes is the tenth trope based on $c$.

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Example 28 is a trope picture in Hauer's notation of the tenth trope as it appears in Trope Table X in the appendix of Zwölftontechnik.

There are twenty-four three-measure segments, the majority of which follow the pattern of first hexachord, second hexachord, second hexachord, first hexachord, second, second, and so on. The exceptions to this pattern occur in only three instances: at the beginning measures, 4, 5, and 6; in measure 32 where a sequence occurs in the violins, and in measure 50 where there is a return or "recapitulation"—a stressing of the first trope half and a close approximation of the first measure of the work.
Occasionally a note may be missing in a hexachord. If this is the case, it may be located in the previous measure—usually on the fourth beat—as close to the incomplete measure as possible. (See mm. 4, 17, 23, 29, etc.) These omissions usually occur at three- or six-measure intervals, but it has not been possible to suggest a reason for this displacement. These unused notes most often occur in the succeeding measure in his other works.

As was mentioned earlier each trope is divided into two hexachords. These in turn are used to form three-hexachordal segments in which, for the most part, the second
hexachord is repeated. This gives rise to the pattern ABB, and only four of the twenty-four groups vary from this sequence; three use an A A B repetition and the other an A B A. The final chord has two notes from each hexachord. It is interesting how these variant patterns occur

Ex. 31. Pattern of Hexachord Segments.

| MM.: | 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, |
| Hexachord: | A B B A A B A B B A B B |
| 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, |
| 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, |
| A A B A B B A B B A B B A B B |
| 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60 |
| A B A A A B A B B A B B A B B |
| 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73 |
| A B B A B B A B B A B B Chord |

just at the points Hauer is introducing a more traditional musical usage, especially the repetition of the initial trope pattern in the seventeenth group (mm. 49-51) and the striking sequence of the first half in the eleventh group (mm. 31-32).

Considering the movement as a whole there are two ideas which serve as unifying factors: the first is, of course, the use of the same trope throughout. Many of Hauer's second period works employ a different trope for every measure of a work (see the first Etude of Opus 22). The other
main unifying factor is a recurring rhythmic motive, which utilizes four staccato eighth notes followed by a longer value.

Ex. 32. J. M. Hauer, Sechste Streichquartett, First movement, mm. 2.

Besides the syncopation which Hauer uses to portray the jazz idioms, he also includes at the beginning and end of his movements some type of seventh chord. The first movement begins with a minor seventh chord on $\text{g}$. Three of its tones are drawn from the first hexachord and one from the second.

Ex. 33. J. M. Hauer, Sechste Streichquartett, First movement, mm. 1.
The final chord (Ex. 34) consists of two notes from each hexachord.

Ex. 34. J. M. Hauer, *Sechste Streichquartett*, 1st movement, mm. 73.

A comparison with those chords (Ex. 35) which begin and end the other three movements reveals much the same harmonic structure:

Although this work begins and ends on a "tonal" chord, it would be a mistake to attempt to analyze it harmonically, as it is as contrapuntally conceived as is a piece of Renaissance polyphony. Indeed, Hauer often makes use of polyphonic devices such as imitation, sequence, and even retrograde. Example 33 shows such a retrograde as it occurs in the first movement.

Ex. 36. J. M. Hauer, Sechste Streichquartett, 1st movement, mm. 2-3.

Period III. The Twelve-tone Game

Concerning the works of his last period, especially the twelve-tone games, Hauer said in 1955, "Music died long ago. Now it is only a game of mathematics." As his control over the formal elements (strict total organization and determination of all components) improved in his last period, the musically romantic ideas disappeared, leaving purely theoretical techniques sometimes devoid of musical inspiration. From 1939 on, after Opus 89 (the Zwölfton-musik für Orchester) Hauer wrote only twelve-tone games,
which he differentiated partly by numbering, partly by dating. In this last twenty-year period, from 1939 to the year of his death, 1959, Hauer composed some thousand twelve-tone games. Only a fraction of the number were published; how many more survive is not known.\textsuperscript{6}

The basis of Hauer's compositional technique during the second period was the hexachord, but during the twelve-tone-game period, he no longer composed his works out of these halves. Instead he erected entire compositions on a single twelve-tone row.\textsuperscript{7} As part of the strict playing rules of the twelve-tone games, the row was brought into harmony, at best four-voiced, and then the melodies with their manifold rhythms were unfolded through them. This harmonization usually consisted of providing a chord for each tone of the row. Throughout one game the tone was harmonized with the same chord. This later became known as the "harmonic band." To this basic idea, he later added many variations. In Game XXII, for example, the second half of the piece is a retrograde of the row of the first half, but now with a new set of chords. At the beginning and the end of his twelve-tone games, he continued to follow his

\textsuperscript{6} See page 19.

\textsuperscript{7} Walter Szmolyan, Josef Matthias Hauer; eine Studie (Vienna, 1965), 10.
predilection for a major seventh chord, which, according to his view, combined the essence of major and minor (thirds). The twelve-tone game is much like a chaconne in that variation is achieved by changing rhythms on each repetition of the harmonic structure.

The Twenty-second Twelve-tone Game for piano (1946), which is in symmetrical binary form, is based on the following row with its chords as shown in Ex. 37. Each row-tone maintains its own chord (the harmonic band) which is often a type of seventh chord. In the first half of the bipartite form, (mm. 1-72) the row is presented forwards in the fashion shown in Ex. 38, while in the second half (mm. 73-147) the row is in retrograde (Ex. 39).
With the reversal of the row, a new harmonic band is constructed. (Ex. 40). The row is based on the twenty-first trope on g-sharp of the old table VI and may be found as trope twenty-seven in the new (1948) table. (Ex. 41a and 41b).
Ex. 40. Retrograde of Row and New Harmonic Band.

Ex. 41a. Trope 21 (1925).

Ex. 41b. Trope 27 (1948).

Overall, total organization and determination of the parts are characteristic of the form and content of the Twenty-second Twelve-tone Game. Unity is given by the device of isometric use of the tone-row with the rhythm and texture in several layers. First, there is an isometric use of the tone-row with the rhythm and texture. The row
consists of five notes within six measures; the fifth tone is held over into the sixth measure by a tie. The rhythm, which is linked to the texture, is in measures of six, while the row itself is in measures of five. Thus, fourteen measures are required to state the twelve-tone row once, while the texture and rhythm are completed in twelve measures. (Ex. 42).

Ex. 42. Isometric Design of Tone-row, Texture, and Rhythm.

Tone-row: \[
\begin{array}{cccc}
1 - 5 & 6 - 10 & 11 - 3 \\
\text{6 m.} & \text{6 m.} & \text{6 m.}
\end{array}
\]

Rhythm,

Texture: broken chords \[
\begin{array}{c}
\text{12 m.}
\end{array}
\]

block chords \[
\begin{array}{c}
\text{12 m.}
\end{array}
\]

e tc.

Second, the rhythm and texture form a larger (6 x 12 meas.) segment of the form. The first half of the piece consists of Measure = \[
\begin{array}{cccccccc}
12 & 12 & 12 & 12 & 12 & 12 & 12 & 12
\end{array}
\], which is an amplified version of the isometric use of the tone-row with the rhythm and texture (i.e., five different sections of texture, with the fifth containing twice the number of measures as any of the other sections).
Although Hauer composed more than one thousand works, very few, if any, are being performed today. It is true that many of these pieces are devoid of inspiration or craftsmanship, but there are some which merit a hearing. One of these is the Twenty-second Twelve-tone Game, an exciting work which combines a traditional, diatonic sound with dodecaphonic writing.
CHAPTER VIII

CONCLUSION

In his lecture, *The Origins of Schoenberg's Twelve-Tone System*, Egon Wellesz relates the following account:

It was in 1916 that a private in the Austrian army was sent to me because the military psychiatrists found that he was so neurotic and talked about music in such a peculiar way that they did not know what to do with him and wanted my advice. The man was Josef Hauer. Hauer had developed in his compositions the idea of twelve-note rows which, according to his theory, had the same function as the "nomoi," the type melodies in Greek music. Though Hauer expressed his views in a very amateurish way, I found his ideas very interesting and his attitude toward music reminded me of Erik Satie. I think that my favorable report helped to get Hauer released from his work in an army office. Reti, of whose judgment Schoenberg thought highly, told him about Hauer's theories and compositions, and Schoenberg began to develop these ideas which led him to introduce the system of composition with twelve tones.

There can be no doubt that Hauer was the first to construct rows of twelve notes—rather haphazardly—and to choose which one of them suited him best for a composition.\(^1\)

Even though Wellesz maintained that the idea of a twelve-note pattern was born with Hauer, he failed to gain recognition partly because he used the system rather rigidly, and at times, unimaginatively. Schoenberg made no claim of universal application, as did Hauer, and set no limit to

the series as a system. The lack of recognition of Hauer's works may be due to what Schoenberg has summed up in the following statement: "Hauer's works appear more as examples of theory than actual compositions themselves." Even less kindly, a Schoenberg admirer, Theodor Wiesengrund-Adorno, hailed Hauer as a "perpetual-motion composer." Unfortunately, these cogent remarks served only to embitter Hauer rather than to spur him on to compositional self-evaluation and criticism. Instead, he retreated into an ever-deepening shell, until he withdrew completely from the world and its harsh realities. Although Schoenberg and his circle had initially attempted to aid Hauer—even permitting him to perform his works at their private concerts—Hauer took offense at the slightest error on the performers' part, and accused the Society and the press of "sabotaging" his works. Perhaps a less suspicious and more musically-educated mind would have reacted in a less volatile manner. To Hauer's dying day, he reproached the world for believing that Schoenberg had "invented" the twelve-tone technique. On the other hand, Schoenberg did nothing to prevent this notion from being fostered.

2Walter Szmolyan. Josef Matthias Hauer; eine Studie (Vienna, 1965), 44.

3Ibid., 49.
Even if Hauer had not discovered the twelve-tone law first, it is almost certain that Schoenberg or someone else in his circle would have eventually grasped its concept. Perhaps Hauer should be regarded as a stepping-stone or link in the chain of musico-historical events. Although he is not indispensible to it, he is nevertheless important to music history as an innovator. Not only was he the first to discover the twelve-tone law, he also foresaw many other musical events which have taken place in the last fifty years. Considering the development which avant-garde music has taken recently, Hauer has emerged as radical and modern—not only as an inventor of a new notation and a composer of aleatoric music, but also as a prophet, foreseeing both total serialization and electronic music.

Moreover, contemporary interest in oriental music and compositional techniques (such as those of Messiaen) did not escape Hauer's studies. The "desired monotony" indicated in his compositions (sempre mp—strict time) is one characteristic of oriental music with its hypnotic effects and "timelessness."

Hauer's treatises are not easily available. Although there is some informative material to be found in them, most of the content is not readily usable to the practicing musician. Yet, the rambling, aesthetic, philosophical content of the treatises may be of some interest to the musical aesthetician or musicologist—especially one interested in the
color-music theories of the early twentieth century. In his first two treatises, *Vom Wesen des Musikalischen* and *Vom Melos zur Pauke*, one may scarcely discover Hauer's "secret" compositional techniques. Instead, one finds primarily a defense or argument for Hauer's own views on music—an apologia for his twelve-tone, equal-tempered compositions. Some compositional techniques, however, may be obtained from the third volume, *Zwölftontechnik*, which does delve into Hauer's works to some extent.

It seems quite likely that if Hauer had taken a different stance—graciously accepting the comments and aid of other more experienced composers and musicians—he might have emerged a much more competent composer. Not only might his works still be heard today, but he would also be recognized as the first to write a kind of music which is now thought to belong to others. Indeed, the situation exists as Hauer once assessed it: "I have lost my first birthright."
APPENDIX A
WORKS*

It is impossible at present to make a complete catalogue of Hauer's works, since many of his compositions are lost or in private hands, especially those from his last creative period. The subsequent list is based essentially on the following sources:

- Autograph catalogue of June 27, 1934.
- Publication catalogues of Universal-Edition and Fortissimo-Verlag, both of Vienna.

In some of Hauer's compositions, alternate instrumentation is given; where applicable, this is placed in parentheses. Also included are the dates of composition, and the publishing companies, which are indicated by the following abbreviations:

- PC = Publication by the composer
- VSH = Verlag Schlesinger, Berlin--Haslinger, Vienna; later, Robert Lienau Verlag, Berlin-Lichterfelde
- UE = Universal-Editions, Vienna
- FV = Fortissimo-Verlag, Vienna

*The following list of Hauer's works is taken from Monika Lichtenfeld, Untersuchungen zur Theorie der Zwölfton-technik bei Josef Matthias Hauer, Gustav Bosse Verlag, Regensburg, 1964, 190-201.
1. Works with opus numbers:

Opus

1 Nomos in sieben Teilen (earlier: First Symphony, Symphonic Pieces) für Klavier und Streicher (harmonium), dedicated to Ferdinand Ebner, late autumn, 1912, PC.

2 Nomos in fünf Teilen (earlier: Second Symphony) für Klavier und Streicher, dedicated to Adolf Deutsch, Easter 1913, PC.

3 Sieben kleine Stücke für Klavier, spring, 1913, PC, later UE, (No. 8380, 1925).

4 Lied des Letzten (after Josef Räuscher) manuscript in the possession of Gertrud Köchert, Vienna.

5 Apokalyptische Phantasie (earlier: Third Symphony) for chamber orchestra (piano and strings) dedicated to Marie Therese, September 16 to October 23, 1913, PC.

6 Hölderlin-lieder für mittlere Stimme und Klavier, dedicated to Anna Bahr-Mildenburg, May to June 1914, PC, later UE (No. 9443, 1928)
   1. Der gute Glaube 2. Hyperions Schicksalslied

7 Chorlieder aus den Tragödien des Sophokles (after the translation by J.J.C. Donner) für Männerchor mit Klavier (organ) dedicated to Josef Räuscher, June 1914, PC, later VSH.

8 Kyrie eleison für Klavier (harmonium) und Streicher, dedicated to Georg Zissler, June 1914, PC.

9 Morgenländisches Märchen für Klavier (harmonium), dedicated "to my dear wife," January 1915, PC, later UE (No. 8380, 1925).

10 Tanz für Klavier, dedicated to Elsie Altmann, February 3 to 10, 1915, PC, later UE (no. 8380, 1925).

11 Prometheus (after Goethe) für Bariton und Klavier (orchestra), manuscript in the possession of Gertrud Köchert, Vienna.
Opus


13 Über die Klangfarbe, 1918, PC.

14 Lied (after Karl Kraus), lost.

15 Fünf kleine Stücke für Klavier (harmonium), dedicated to Wilhelm Fischer, April 30, to May 5, 1919, PC (in twelve-tone notation).

16 Nachklangstudien für Klavier, dedicated to Anna Höllering, July 21 to August 4, 1919, PC, later UE (No. 8380, 1925).

17 Phantasie für Klavier, dedicated to Hildegard Itten, July 21 to August 24, 1919, PC.

18 Schlussszene aus "Der gefesselte Prometheus" (after Aeschylus) for baritone and piano, dedicated to Johannes Itten, October to November 29, 1919, PC.

19 Nomos in einem Satz für Klavier (harmonium) und Streicher, dedicated to Agathe Kornfeld, August 25 to 29, 1919, PC.

20 Atonale Musik, Klavierstücke, two books, 1922, VSH (1923).

21 Hölderlin-Lieder für mittlere Stimme und Klavier, June 1922, VSH (1925).
   1. Liebe  2. Hälftte des Lebens  3. Der Frühling

22 Atonale Etüden (Neun melodiose Zwölftonetüden, Vortragsstücke für höherorganisierte Hörer) für Klavier, dedicated to Arnold Schönberg on his fiftieth birthday, 1922, UE (No. 8381 a/b, 1926).

23 Hölderlin-Lieder für mittlere Stimme und Klavier, numbers one and two dedicated to Hugo Breuer, three and four to Gertrud Köchert, UE (No. 9444, 1929).
   1. Abendphantasie  2. Der gefesselte Strom
   3. Des Morgens  4. An die Parzen
Opus

24 *Lied der Liebe* (after Hölderlin) for three-part women's chorus, piano and harmonium.

25 *Sechzig kleine Stücke für Klavier mit Überschriften nach Worten von Hölderlin*, dedicated to Erich Köchert, August 22 to October 11, 1923, Manuscript in the possession of Gertrud Köchert, Vienna; 16 pieces from the collection, VSH (1924).

26 *Quintett für Klavier, Klarinette, Violine, Viola und Violoncello*, dedicated to Gertrud Köchert, February 27, 1924, VSH (1924).

27 *Schalmeien für Klarinette und Klavier*, Manuscript in the possession of Willi Reich.


29 *Stücke für Violoncello und Klavier*, manuscript in the possession of Joachim Stutschewski.

30 *Fünf Stücke für Streichquartett (First String Quartet)*, dedicated to Gertrud Köchert, April 18 to 24, 1924, VSH (1924).

31 *Erste Suite für Orchester*, VSH (1925)


33 *Zweite Suite für Orchester*, VSH (1925).

34 *Stücke für Streichquartett (Second String Quartett)* manuscript in possession of Rudolf Kolisch.

35 *Sextett (Sieben Variationen über einen melischen Grundgedanken) für Flöte, Klarinette, Violine, Viola, Violoncello und Kontrabass*, lost.
Opus


37 Romantische Phantasie für Orchester, Easter 1925, UE.

38 Drittes Streichquartett (in one movement).

39 Phantasie für Klavier, dedicated to Albert Linschütz, manuscript in the possession of Hermann Heiss, Darmstadt.


41 Stücke für Violine und Klavier, manuscript in possession of Hugo Gottesmann, Vienna.

42 Viertes Streichquartett, manuscript in the possession of Otto Breuer, Vienna.

43 Vierte Suite für Orchester, UE.

44 Lateinische Messe für gemischten Chor, Orgel, Flöte, Oboe, Klarinette, Horn, Trompete, Posaune und Streichquartett, manuscript in the Royal Library, Donaueschingen.

45 Fünfte Suite für Orchester, UE.

46 Lateinische Messe, incomplete, manuscript in the possession of Stefanie Schiffmann, Vienna.

47 Sechste Suite für Orchester, dedicated to Erwin Lang, UE (No. 8686/8687, 1926).

48 Siebente Suite für Orchester, dedicated to Erwin Lang, UE (No. 9429, 1928).

49 Fantasien (Kammerstücke) für Streichorchester, Klavier und Orgel (String quartet, piano, and harmonium) UE.
Opus

50 Sinfonietta, Symphonische Stücke für grosses Orchester, dedicated to Lilly Kleinschmidt, 1927, UE (1929).

51 Music-Film, eine Folge von kleinen charakteristischen Stücken für Pianoforte, dedicated to Gertrud Köchert, April 30, 1927, manuscript in the possession of Gertrud Köchert, Vienna.


53 Wandlungen (after Hölderlin), Kammeroratorium für Bühne oder Konzert, für sechs Solostimmen, gemischten Chor und Orchester, December 5, 1927, UE (1929).

54 Konzert für Violine und Orchester in one movement, March 9 to April 6, 1928, UE.

55 Konzert für Klavier und Orchester in one movement, 1928, UE.

56 Charakterstücke mit Überschriften, for violin solo.

57 Vom Leben (after Hölderlin), eine poetische Lesung mit Musik, for speaker, small mixed chorus, and small orchestra, UE.

58 Emilie vor ihrem Brauttag (after Hölderlin), cantata for alto solo and orchestra, November 8 to 21, 1928, UE.

59 Charakterstücke für violoncello solo.

60 Salambo, Oper in sieben Bildern nach dem Roman von Gustave Flaubert, May 19 to August 3, 1929, UE.

61 Divertimento für kleines Orchester in einem Satz, dedicated to Othmar Steinbauer, May 5, 1930, manuscript with UE.

62 Die schwarze Spinne, deutsches Singspiel von Hans Schlesinger nach der gleichnamigen Erzählung von Jeremias Gotthelf, July 24, 1932, manuscript with UE.
Opus

63 **Konzertstück für Orchester**, manuscript with UE.

64 **Diabolo, Konzertstück für kleines Orchester**, manuscript in the possession of Hermann Scherchen.

65 **Erste und zweite Tanzphantasie für vier Solostimmen und Orchester.**

66 **Dritte, vierte, fünfte, sechste und siebente Tanzphantasie für kleines Orchester.**

67 **Der Menschen Weg** (after Hölderlin), cantata in five parts for four solo voices, mixed chorus, and orchestra, first collection 1934, second collection 1952, Ars-viva-Verlag, Zürich, later UE (1953).

68 **Empedokles** (after Hölderlin), dramatic songs for solos, men's chorus, and orchestra, 1935, manuscript in the possession of Gertrud Kochert, Vienna.

69 Undetermined.

70 **Erste Tanzsuite für neun Soloinstrumente**, June 5, 1936, UE.

71 **Zweite Tanzsuite für neun Soloinstrumente**, dedicated to Bruno Hauer, Christmas 1936, UE.

72 to 88 Undetermined.

89 **Zwölftonmusik für Orchester**, dedicated to Hans Muschik, August 4, 1939, manuscript in the possession of Johann Muschik, Vienna.

2. Works without opus numbers.

**Meine geliebten Tale lächeln mich an** (after Hölderlin) for medium voice and piano, 1949.

**Hölderlin-Rezitationen für Frauenstimme und Klavier**, dedicated to Grete Kammerlander, April 30, 1949, manuscript in the possession of Wolfgang Kammerlander, Vienna.

Chinesisches Streichquartett, 1953.

Langsamer Walzer für Orchester, 1953.


3. Zwölftonspiele (Twelve-tone Games)

a) with date of origin

Zwölftonespiel für Orchester, dedicated to Matthias Winkelmayer on his 70th birthday, May-June 1943, manuscript in the possession of the Österreichischen Musik-Zeitschrift, Vienna.

Zwölftonspiele für Orchester, May-June 1943, manuscript in the possession of the Hauer-Studios Victor Sokolowski, Vienna.

XIX. Zwölftonspie1 für Orchester, March 26, 1945 manuscript in the possession of the Hauer-Studios Victor Sokolowski, Vienna.

XXII. Zwölftonspiel für Klavier, 1946, UE-Klavierbuch (No. 12046, 1951).

Zwölftonspiel für Klavierquintett, 1946, manuscript in the Bibliothek des Internationalen Musikinstituts, Darmstadt.

XXVII. Zwölftonspiel für Streichquartett und Cembalo, March 11, 1946, manuscript in the possession of the Hauer-Studios Victor Sokolowski, Vienna.

Zwölftonspiel für Orchester, November 29, 1946, manuscript in the possession of the Hauer-Studios Victor Sokolowski, Vienna.

Zwölftonspiel für Klavier, Christmas, 1946, FV (No. 711.)

Zwölftonspiel für Violine und Klarinette, dedicated to Friedrich Wildgans, Christmas, 1946.
Zwölftonspiel für Klarinette und Klavier, Christmas 1946.


Zwölftonspiel für Klarinette und Streichquartett, March 16, 1947, manuscript in the possession of the Hauer-Studios Victor Sokolowski, Vienna.

Zwölftonspiel für Klarinette und Streichquartett, dedicated to Friedrich Wilgans, May 17, 1947, manuscript in the possession of Friedrich Wildgans, Vienna.

Zwölftonspiel für Cembalo und Viola, April 24, 1947, manuscript in the possession of the Hauer-Studios Victor Sokolowski, Vienna.

Zwölftonspiel für Streichzither und Gitarre, May 9, 1947, manuscript in the possession of the Hauer-Studios Victor Sokolowski, Vienna.

Zwölftonspiel für Klarinette und Klavier, dedicated to Friedrich Wilgans, May 17, 1947, manuscript in the possession of Friedrich Wildgans, Vienna.

Zwölftonspiel für zwei Frauenstimmen, zwei Männerstimmen und Cembalo (Subtitle: "Oh, diese Ideologen"), July 30, 1947, manuscript in the possession of the Hauer-Studios Victor Sokolowski, Vienna.

Zwölftonspiel für Klarinette, Violine, Viola, Violoncello und Klavier, Christmas 1947, manuscript in the possession of Friedrich Wildgans, Vienna.

Zwölftonspiel für Cembalo und Violine, July 22, 1948, manuscript in the possession of the Hauer-Studios Victor Sokolowski, Vienna.

Zwölftonspiel für fünf Violinen, May 24, 1950, manuscript in the possession of Leo Walter Reichl, Vienna.

Zwölftonspiel für fünf Violinen, dedicated to Theodor Körner, May 1950, manuscript in the Vienna Stadtbibliothek.

Zwölftonspiel für Orchester, June 10, 1950, manuscript in the possession of Leo Walter Reichl, Vienna.

Zwölftonspiel für fünf Instrumente, dedicated to Victor Sokolowski, August 1951.
Zwölftonspiel für Klavier zu 4 Händen und Streichquartett, November 28, 1951, manuscript in the possession of Bruno Hauer, Vienna.

Zwölftonspiel für Klavier zu 4 Händen, dedicated to Hans Mandl, April-May 1952, Manuscript in the Vienna Stadtbibliothek.


Zwölftonspiel für Klavier zu 4 Händen, July 10, 1952, manuscript in the possession of Leo Walter Reichl, Vienna.

Zwölftonspiel für Klavier zu 4 Händen und Harmonium, July 16, 1952, manuscript in the possession of Leo Walter Reichl, Vienna.

Zwölftonspiel für Klavier und Harmonium, September 27, 1952, manuscript in the possession of Leo Walter Reichl, Vienna.

Zwölftonspiel für Cembalo, November 2, 1952, manuscript in the possession of the Hauer-Studios Victor Sokolowski, Vienna.

Zwölftonspiel für Klavier, March 1953, FV (No. 712).


Zwölftonspiel für zwei Violinen und Cembalo, February 1955.


Zwölftonspiel für Cembalo, March 29, 1955, manuscript in the possession of the Hauer-Studios Victor Sokolowski, Vienna.

Zwölftonspiel für Klavier zu 4 Händen, dedicated to Leo Walter Reichl und Victor Sokolowski, April 1955.
Zwölftonspiel für Klavier zu 4 Händen, May 1955, FV (No. 485).

Zwölftonspiel für Klavier, June 2, 1955, FV (No. 712).


Zwölftonspiel für Klavier zu 4 Händen, April 1956, Verlag Doblinger, Vienna (No. 9268, 1956).

Zwölftonspiel für Flöte, Oboe, Bassklarinette, Fagott, Streichquartett und Klavier zu 4 Händen, May 20, 1956, manuscript in possession of Bruno Hauer, Vienna.

Zwölftonspiel für Klavier zu 4 Händen, July 1956, FV (No. 532, 1956).

Zwölftonspiel für Klavier, September 1956, FV (No. 540, 1956).

Zwölftonspiel für Violine, Violoncello und Klavier zu 4 Händen, September 13, 1956, manuscript in the possession of the Hauer-Studios Victor Sokolowski, Vienna.

Zwölftonspiel für Klavier zu 4 Händen, October 1956, FV (No. 549, 1957).

Zwölftonspiel für Streichquartett, January 1957, FV (No. 556, 1957).

Zwölftonspiel für Streichquartett und Klavier zu 4 Händen, April, 1957, FV (No. 565, 1957).


Zwölftonspiel für Orchester, September 22, 1957, manuscript in the possession of Bruno Hauer, Vienna.

Zwölftonspiel für Flöte, Fagott (Bassklarinette) und Streichquartett, January 1958, FV (No. 584, 1958).


Zwölftonspiel für Streichquartett und Klavier, April 16, 1958, manuscript in the possession of Bruno Hauer, Vienna.

Zwölftonspiel für Streichquartett und Klavier, April 26, 1958.

Zwölftonspiel für Streichquartett und Klavier, May 22, 1958, manuscript in the possession of Bruno Hauer, Vienna.


b) Without date of origin:

XVII. Zwölftonspiel für Flöte, Oboe, zwei Klarinetten, Fagott, Horn, Trompete, Posaune, Harfe und Streicher, UE.

XXIV. Zwölftonspiel für Flöte, Oboe, zwei Klarinetten, Fagott, Horn, Trompete, Posaune, Harfe und Streicher, UE.

Zwölftonspiel für Streich- oder Bläserquartett, UE.

Zwölftonspiel für Flöte, Oboe, Fagott, Klavier und Streicher, Ars-viva-Verlag, Mainz (1954).

Zwölftonspiel für Klavierquintett, PC.

Zwölftonspiel für Klavier zu 4 Händen und Harmonium, PC (Facsimile reproduction).

Zwölftonspiel für Klavier (reverse of the preceding), PC (Facsimile reproduction).

Zwölftonspiel für Orchester, manuscript in the Bibliothek des Internationalen Musikinstituts, Darmstadt.
Zwölftonspiel für fünf Violinen, manuscript in the Bibliothek des Internationalen Musikinstituts, Darmstadt.

XXV. Zwölftonspiel für Orchester, (string quartet with 6 players per part and harp), manuscript in the possession of the Hauer-Studios, Victor Sokolowski, Vienna.

XXVIII. Zwölftonspiel für Streichquartett und Klavier (Streichquartett), manuscript in the possession of the Hauer-Studios, Victor Sokolowski, Vienna.

Zwölftonspiel für Klarinette, Violine, Viola, Violoncello und Klavier, dedicated to Friedrich Wildgans, manuscript in the possession of Friedrich Wildgans, Vienna.

Zwölftonspiel für Orgel, manuscript in the possession of the Hauer-Studios, Victor Sokolowski, Vienna.

Zwölftonspiel für Streichquartett, manuscript in the possession of Friedrich Wildgans, Vienna.

Zwölftonspiel fur Quintett, dedicated to Karl Schwarz.

XXIX. Zwölftonspiel (probably 1946).

XXX. Zwölftonspiel (probably 1946).
Editorial Additions to the New (1966) Universal Edition of *Vom Wesen des Musikalischen*

The work under consideration, the first ever written on twelve-tone music, is an amplification of the essay, *Concerning Tone-color* (Vienna 1918). It assumes a key position among Josef Matthias Hauer's writings, since it forms the hypothesis of the origin of his compositions and, above all, the twelve-tone game.

The original texts of the first edition, in connection with Waldheim-Eberle, Vienna 1920, and the second edition with the music publishing house, Robert Lienau, Berlin-Lichterfelde, 1923, have both been preserved here. This publication presents the results of his study as well as the synthesis of Hauer's earlier works. Thereby Hauer became cognizant of the extraordinary significance of the twelve half-step equal temperament, and that of its resulting "twelve-tone law." From this development it was only one more step to the "forty-four tropes" (twelve-tone constellations) through which the 479,001,600 possible melodic combinations of the tone-universe were obtainable. The tropes form the scholarly foundation of the "Twelve-tone Game: discovered about 1940, which is based on the axiom of equal temperament (on the supposition and foundation of
spiritual hearing!) The twelve-tone law, the "Nomos," arises directly out of the fluctuating trope constellations, in which the harmony of every twelve-tone row is also contained.

The present work also includes, for the first time, the "twelve-tone notation," which forms the basis of the "melodic outlines" discovered some years later. In the twelve-tone game, which can be designated as a crystal of the cosmic harmony (of the inner, qualitative time) molded into finiteness, the "melodic outline" was conveyed to the four voice ranges in the course of which the individual voices are symbolized by four colors.

In an intuitive way Hauer perceived the conformity of playing with twelve tempered half-tones, and founded an international language which all people understand. These regulations which Hauer discovered signify an eminent building plan for every one—a road to contemplation, which is made straight by a spiritual means—Melos.

In his manifesto of May 6, 1958, Hauer could acknowledge: "The discovery of the Twelve-tone Law was only a realization of something already existing within me, a spiritual reality. In twelve-tone music, everything is there which generally makes up the constituents of music; namely:
melody, harmony, and rhythm. Therefore the crucial thing in working with a twelve-tone row is the ability to read its organic laws.

"For that reason, just as one would create a psycho-physical hypothesis, I demonstrate only the 'Way' to my pupils. Since I was able to complete my work, that has become possible for me. In my whole life I have written only one work: the Twelve-tone Game!"

Vienna, March 19, 1966

Victor Sokolowski.
The twelve-tone notation is obvious and easily learned by everyone as it is a representation of the keyboard. The notes on the lines represent the tones of the black keys, those in the spaces, the tones of the white keys. The treble clef \( \text{\small \text{\textsc{f}}} \) designates the one-line g-sharp or a-flat. The alto clef \( \text{\small \text{\textsc{b}}} \) designates the one-line \( \text{\small \text{\textsc{d}}} \). The bass clef \( \text{\small \text{\textsc{c}}} \) designates the small g-sharp or a-flat.

This is Hauer's autograph explanation of his twelve-tone notation. Although it is mentioned on page 61, it is not explained. The ciphers used below the example of Hauer's notational system are not included in the explanation; they designate the position of the one-line \( \text{\small \text{\textsc{d}}} \). (The editor.)
APPENDIX C
# TABLE I

**TROPE TRANPOSITION ON E-FLAT**

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### TABLE II

**TRANSPOSITION ON E**

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TABLE IV

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TABLE VI

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TABLE VII

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# TABLE XI

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TABLE XII

TRANSPOSITION ON D
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Books


________________________. Vom Melos zur Pauke: Eine Einführung in die Zwölftonmusik. 1925.


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**Articles**


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