

The Quarter-Tone System of Charles Ives

Harry Perison

Microtonal intervals are certainly not an invention of the 20th century—their use has been documented in the theoretical system of Greek Antiquity, and certain medieval sources contain convincing evidence of microtones. Some theoretical systems of the 16th and 17th centuries involved as many as thirty-one divisions of the octave, and as early as 1895 the Mexican composer Julian Carillo (b. 1875) was using a system (*Sonido Trece*) that divided the octave into ninety-six intervals. The principal work with microtones during the first half of the 20th century was done by the Czech composer Alois Haba (b. 1893), whose style is basically a combination of athematic serialism with scales of quarter-, sixth-, and twelfth-tones.

Charles Ives's quarter-tone compositions are almost unique in the music of the United States in the early 20th century. His first known effort (dating from as early as 1903 and certainly no later than 1914¹) was the *Chorale* for strings in quarter tones, in which his quarter-tone system is already fully developed. This was later arranged for a quarter-tone piano with two keyboards, the upper tuned a quarter-tone sharp,² and in 1923–24 it became the third piece of the set *Three Quarter-Tone Pieces*, for two pianos, one tuned normally, the other a quarter-tone higher. The first piece (“Largo”) was composed for the quarter-tone piano in 1923–24; the second (“Allegro”) is an expansion of material from earlier pieces, in this case written specifically for two pianos, to be part of the set.³

The first performance of *Chorale* took place on 8 February 1925, in Chickering Hall in New York, with Hans Barth and Sigmund Klein performing it on two pianos. This program also included quarter-tone pieces for unaccompanied violin by Alois Haba.⁴

The complete set was given its first performance on 14 February 1925, by Barth and Klein in Aeolian Hall in New York, as part of the second international Referendum Concert sponsored by the Franco-American Musical Society, of which Ives was a member. This concert included works by a number of prominent European composers, among them Tailleferre, Bartók, and Stravinsky, and E. Robert Schmitz presented a lecture on quarter-tone music. Reviews by W. J. Henderson⁵ and Olin Downes⁶ indicate something less than popular acclaim for Ives's pieces (“excited many of the hearers to laughter”), but both reviewers were too cautious to flatly condemn them.

Almost forty years passed before the next known performance. In October of 1963 the pieces were played by George Pappastavrou and Nicholas Zumbro at the Museum of Modern Art in New York. This time the reviewers were almost enthusiastic:

It was his "Three Quarter-Tone Pieces for Two Pianos," not heard in New York since 1925, that ignited the evening with its extraordinary pitch differential and its harmonic double exposure. . . . The results are akin to the distorted image one perceives of an object floating in shallow waters, or, for that matter, of someone who's had one too many trying to sing a song.⁷

These pieces . . . have not been heard in over forty years and it is a pity, for they are beautiful. . . . Throughout, the quarter-tones are organic.⁸

Arthur Cohn was more conservative in his review of the *Odyssey* recording⁹; he found the pieces "somewhat academic" and concluded that "it will take considerable work by composers, and parallel exposure to auditors, before fractional tones will not be viewed as strangers to the sonorous world."¹⁰

It is fortunate that Ives at least once broke his habitual silence about the technical aspects of his music. In the March 1925 issue of the *Franco-American Musical Society Quarterly Bulletin* there appeared an article by the composer, "Some Quarter-Tone Impressions," which revealed the theoretical basis for these pieces.¹¹ Perhaps because of the negative reaction to quarter-tone music, Ives felt it necessary to explain a system so revolutionary for New York in the 1920s.

Ives's interest in quarter-tones was apparently stimulated by his father. In his article he relates his father's experiments, at first with quarter-tone melodies which he attempted to get his family to sing (an attempt not totally successful—the final use of quarter-tone melodies was as punishment), and then with chords which he felt were a necessary foundation for the melodies. This led to the construction of a device capable of sustaining quarter-tone harmonies: a series of violin strings appropriately tuned and activated by weighted bows. These experiments were terminated by popular demand of family and neighbors.¹²

Ives must have devised his quarter-tone system empirically. He has left no description of its origins, only a system of three basic chords and mention of two others which he rejected as unsuitable. He found triads inappropriate in quarter-tone music, explaining that if a triad is created by the addition of a quarter-tone interval to two notes which constitute a diatonic interval, the result sounds out-of-tune, as for example the diatonic fifth C–G with D \sharp added. (The symbol \downarrow indicates one-quarter-tone sharp; \sharp indicates three-quarter-tones sharp.)¹³ This chord is perceived as an unstable sound that the listener hears as out-of-tune major or minor. But

if another note is added which will make a quarter-tone interval with either of the two notes which make the diatonic interval, we have a balanced chord which, if listened to without prejudice, leans neither way, and which seems to establish an identity of its own . . . neither major, minor, nor even diminished.¹⁴

This first chord consists of four notes, all at equal seven-quarter-tone intervals (350 cents), except for the interval formed by the fourth note and the octave of the root (150 cents). Ives calls this chord “major” because its intervals are larger than those of the second chord. This chord has much of the character of the augmented triad or diminished seventh chord, with its equal spacing and resulting flexibility in inversions, a quality that Ives points out near the end of the article.¹⁵ Its stability may derive from the presence of two perfect fifths, one between the two diatonic pitches, the other between the two quarter-tone pitches (Ex. 1).¹⁶

EXAMPLE 1



Ives recognized a need for the perfect fifth, “that inexorable thing—a part of natural laws which apparently no aesthetic principle has yet beaten out.” But he longed for the day when some genius would “suppress him [the fifth] with a blow from a new natural law.”¹⁷

Two other combinations are considered as “major” chords: C–E \flat –G–B \flat and C–E–G \flat –A \sharp . The first is rejected because of the “narrow interval” between B \flat and the octave of the root, the second not only because of its lack of a perfect fifth, but also because of the disturbing presence of a major third, with its strong diatonic implications.¹⁸

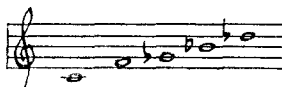
The second basic chord is similarly constructed, but now of five notes at equal five-quarter-tone intervals (250 cents) and with three perfect fourths; it too has a smaller interval (200 cents) between its highest note and the octave of its root (Ex. 2):

EXAMPLE 2



But he prefers to use it in a slightly different configuration which he does not view as an inversion but as root position. He considers it to have a “more malleable sound,” and therefore to be in a “more useful form.” This chord has less finality than the “major,” is “absorbed readily into the fundamental,” has smaller intervals, and in general has a contrasting character. In this form it is spelled (Ex. 3):

EXAMPLE 3

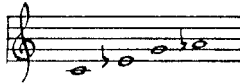


Ives's next step is to provide acoustical justification for these chords, albeit in a half-hearted manner. He bases his procedure on William Pole's adaptation of Helmholtz's theory of relationship between beats of adjacent partials of chord tones and the degree of aural roughness.¹⁹ The proof is not entirely convincing—the degree of roughness for his chords is fairly high—and he concludes:

It has seemed to me that the value of measuring "roughness" is relative. I can't see why a great deal doesn't depend on how hard the notes are struck (their amplitude) or on the instruments playing them . . . I don't see how one can always measure by vibrations he doesn't always hear.²⁰

A third ("subsidiary") chord is proposed, one having the intervallic structure of "nine-five-five." It is "comparatively weak-sounding, and therefore pliable, but its vibration measurements are all out of whack." Nevertheless, this chord is used occasionally. Interpreting "nine-five-five" as intervals of quarter tones, this chord is spelled as follows (Ex. 4):

EXAMPLE 4



This chord also has a perfect fifth and a perfect fourth, but its intervals are unequal.²¹

Each of these chords may be constructed on any of the twenty-four pitches of the quarter-tone octave, yielding "combinations and permutations that won't do our music any harm." Ives also considers each of them as far less static than diatonic chords; they may be "played quite continuously without holding you up, as a repetition of diatonic chords seems to do." This he attributes to the necessity of the ear to do "a certain amount of adjusting."²² The paragraph that follows in Ives's article suggests an awareness of the value of serial techniques in avoiding that restriction of "organic flow which we feel the need of," but it is so vague as to prevent any clear interpretation of Ives's intentions in this regard.

As for quarter-tone melody, Ives is quite specific in requiring that it not be mere quarter-tone embellishment of a diatonic tune but one in which the notes are about equally distributed between diatonic and quarter-tone pitches. The quarter-tones must not be restricted to passing-tones, suspensions, or neighboring-tones but must be integral members of the quarter-tone chords which support or generate the melody.²³ It must be noted, however, that even in the most purely quarter-tone piece, *Chorale*, there is a great deal of diatonic melody, and that in the first two *Pieces* there is little quarter-tone melody.

Ives states that quarter-tone music, unlike diatonic music, can use parallel

motion just as satisfactorily as contrary motion. In fact, he uses parallel motion more extensively than contrary in pure quarter-tone sections. Less need is felt for passing-tones because of the harsh dissonance they often produce. He hastens to express a hope that the quarter-tone system will not lessen contrapuntal feeling.²⁴

Toward the end of the article Ives discusses mixture of diatonic and quarter-tone materials ("the extension of diatonic chords upward into quarter-tones"), the effect of which is primarily sensuous or coloristic. One such technique includes the simultaneous sounding of augmented triads whose roots are three- or five-quarter-tones distant. An example of this may be seen in the opening measures of the first of the *Three Quarter-Tone Pieces*. Another technique consists of piling up augmented triads whose roots are one quarter-tone apart, distributing them through several octaves. An example may be seen in the second piece, mm. 42–46; the triads here are on C, C \flat , C \sharp , C $\sharp\sharp$, D, D \flat , D \sharp , and D $\sharp\sharp$, all arpeggiated and held by the sustaining pedal. The effect is one of "rhythmic waves similar to the sounds one hears on putting the ear close to a telegraph pole in a high wind."²⁵ This passage intervenes between a section consisting of an interchange of diatonic material between the quarter-tone-distant pianos, and a section in pure quarter-tone harmony.

The most fully-developed quarter-tone technique (although mixed with largely diatonic passages) occurs in the last of the *Pieces*. The work is through-composed, with the exception of a four-measure repetition and two recurrent cadences. The entire piece is based on melodic and rhythmic fragments of *America* and *La Marseillaise*, with the former predominating (an appropriate combination for a concert sponsored by the Franco-American Musical Society). *America* is introduced so gradually as to be almost imperceptible at first, and only in the last thirteen measures does it become completely obvious, although it is incomplete even here.

In the following discussion these conventions will be used: upper case letters indicate "major" chords, lower case "minor," underlined lower case "subsidiary"; a subscript numeral indicates inversion (1 indicates first inversion), and the lack of a subscript indicates root position.

The most obvious use of quarter-tone chords occurs in mm. 10–15, where a diatonic fragment of *La Marseillaise* is accompanied by "minor" chords. The basic pattern consists of four such chords, each complete and unaltered: f/c \sharp /b/g. This pattern is repeated, and a cadence using the chords A/C \sharp /B \flat ₃/C concludes this section. The motion is strictly parallel in all voices, except for passing-notes in the melody-bearing highest voice. There is a notated emphasis on the chord root in Piano I which is encountered frequently, if somewhat inconsistently, in this piece.

A more interesting and more complex treatment is found in mm. 48–60. Here a true quarter-tone *America* (shared equally by the two pianos) is accompanied by root-position quarter-tone chords over a C-pedal and a five-note ostinato (in Piano II, left hand). The basic structure is (Ex. 5):

EXAMPLE 5

48

C G# G# F# G# G# A

There is a high degree of regularity here. The first note of the melody is the third (third note above the root) of the “major” chord, and all succeeding notes are the seconds of “minor” chords in the preferred configuration. The result is strict parallel motion. Following the initial chord the second phrase is treated in an almost identical manner. The initial chord is C \sharp ; the root movement of the succeeding series of “minor” chords is varied slightly, although the approximate shape of the first phrase is preserved (Ex. 6):

EXAMPLE 6

50

C# A# A# A# A# B

The third phrase abandons quarter-tone melody, but the harmony is quarter-tone in the manner of preceding phrases (Ex. 7):

EXAMPLE 7

52

D# B \flat C \flat B \flat C \flat C \sharp

The next phrase continues with a diatonic melody, again with quarter-tone harmony; however, “major” chords in inversion (second inversion) are used (Ex. 8):

EXAMPLE 8

Handwritten musical notation for Example 8, showing a two-staff system. The top staff is in treble clef with a key signature of one sharp (F#) and a 2/2 time signature. The bottom staff is in bass clef. The music consists of quarter notes and half notes. Below the bottom staff, four chords are indicated: F#₂, C#₂, F^b₂, and C.

There follow more inverted chords, incomplete chords (m. 58, first beat: $d\flat_1$, lacking the fourth, c), and one use of an altered “subsidiary” chord (m. 59, first beat: $g\sharp_3$, with $b2$). The alteration in this last instance is dictated by the diatonic statement of the first three notes of *America* (appearing as the highest notes of Piano II) and the C-pedal, also in Piano II. This chord is part of a cadential formula first appearing in mm. 7–9 in conjunction with a fragment of *La Marseillaise* that, without its dotted-figure anacrusis, is identical with the opening three notes of *America*. This is typical of the merging of melodic material in this piece that makes exact identification difficult.

Elsewhere Ives’s use of this quarter-tone system is less regular. Many passages which are obviously quarter-tone can only be interpreted as use of nonharmonic material or altered chords. The beginning of the *Chorale* is such a place; the first chord (C) moves through a $b2$ (alteration or passing-tone) to an incomplete “subsidiary” chord on F, in second inversion, with $\sharp 2$. The next chord is “major” on G, in root position, with $b1$; it resolves to “major” on C. On the other hand, this whole passage might be interpreted as an elaboration or “horizontalization” of the C-“major” sonority.

Measures 16–29 are based on ostinato figures derived from melodic and rhythmic elements of the borrowed tunes. This passage consists of an interchange between the two pianos of diatonic material, of course, at a quarter-tone differential; the effect is polytonal. This technique forms the basis of most of the first and second pieces of the set, as well. A clear statement of part of *La Marseillaise* occurs in mm. 26–27. This brief passage is in G-major (conventional major, not “major”), but with quarter-tone alterations of the chords. A repetition of the quarter-tone cadence of mm. 13–15 concludes this section.

The next section (mm. 30–42) is based on the second part of *America*. This, too, must be regarded as quarter-tone extension of the diatonic system, mostly over a C-pedal. It concludes with a pure quarter-tone cadence followed by repetition of mm. 10–14.

Ives defends the retention of the concept of tonality.²⁶ It is clear that the “major” chord on C acts as a strong tonal center in the *Chorale*, not only because it occurs with remarkable frequency but also because it articulates

major sections. The use of a IV–I–V–I progression (in the conventional sense) in the bass at the close does nothing to weaken the effect.

The ostinato underlying the last part of the *Chorale* is noteworthy; it begins (m. 48) as a five-note pattern which emphasizes the augmented intervals of the fourth, fifth, and sixth, and the major seventh. The pattern is gradually shortened until only the augmented fourth remains—an interval basic to all three of the pieces, but one which does not appear in any of the quarter-tone chords of the system.

An assessment of the musical value of these pieces is difficult. Certainly they are of historical importance, but, unfortunately, they seem to have led nowhere; Ives employed quarter-tones in but a few other works. In *Tone Roads No. 3* (1915) the use of quarter-tones is limited to a six-note cluster which serves as the final sonority of the da capo first section. Quarter-tones figure more prominently in the second movement of the Fourth Symphony (1909–16), but even here the technique is relatively undeveloped. The strings play glissando-like parallel chords or clusters producing an organum effect, and there is an eight-measure optional passage for quarter-tone piano consisting of gradual modifications of ostinato figures. It was only in the *Three Quarter-Tone Pieces* that Ives contrived a reasonably developed quarter-tone system, but it is evident that even here he considered the system tentative at best:

How quarter-tones will affect tonality, how they will help work out satisfactory polytonal and atonal systems, involves so many considerations that I won't venture to say much about it—I've ventured too much already. But it strikes me that a good deal depends on whether or not satisfactory scales can be developed.²⁷

NOTES

¹ John Kirkpatrick, *A Temporary Mimeographed Catalog of the Music Manuscripts and Related Materials of Charles Edward Ives (1874–1954)* (Library of the Yale School of Music, privately printed: 1960), p. 68. One of Ives's lists gives 1903–14; others give 1913–14.

² Charles Ives, *Essays before a Sonata and Other Writings*, ed. Howard Boatwright (New York: Norton, 1962), p. 112.

³ Kirkpatrick, *Catalog*, pp. 103–04.

⁴ Sigmund Klein, "Quarter-Tone Data," *Franco-American Musical Society Quarterly Bulletin* [6] (March 1925): 21–23.

⁵ From a clipping (dated 16 February 1925) in *Miscellaneous Scrapbook*, p. 1, in the Sibley Music Library, Rochester, N.Y. It is presumably from the *New York Sun*, for which Henderson was music critic in 1925.

⁶ *The New York Times*, 15 February 1925, p. 26.

⁷ *Ibid.*, 5 October 1963.

⁸ John Ardoin, "Recitals," *Musical America* 83 (November 1963): 37.

⁹ *Odyssey*, 32-16-0161 (mono); 32-16-0162 (stereo).

¹⁰ "Splitting Semitones," *American Record Guide* 34 (August 1968): 1086–88.

¹¹ Charles Ives, "Some Quarter-Tone Impressions," *Franco-American Musical Society Quarterly Bulletin* [6] (March 1925): 24–33. See also Ives, *Essays* (pp. 107–19), which collates three manuscript versions and the printed article.

¹² Ives, *Essays*, p. 110.

¹³ After Alois Haba, *Neue Harmonielehre des Diatonischen, Chromatischen, Viertel-, Drittel-, Sechstel-, und Zwölftel-Tonsystems* (Leipzig: F. Kistner & C.F.W. Siegel, 1927), p. 140.

¹⁴ Ives, *Essays*, pp. 111–12.

¹⁵ *Ibid.*, pp. 118–19.

¹⁶ All examples are reconstructed from Charles Ives, *Three Quarter-Tone Pieces*, ed. George Pappastavrou (New York: Peters, 1968).

¹⁷ Ives, *Essays*, p. 113.

¹⁸ Howard Boatwright, "Ives' Quarter-Tone Impressions," *Perspectives of New Music* 3 (Spring–Summer 1965): 22–31. (Boatwright apparently overlooks the effect of the third in the last chord.)

¹⁹ William Pole, *Philosophy of Music* (London: Trübner & Co., Ludgate Hill, 1879), pp. 209–22.

²⁰ Ives, *Essays*, p. 114.

²¹ *Ibid.*, p. 115. Boatwright misinterprets this spelling as ninth-fifth-fifth. (See his note c.)

²² *Ibid.*

²³ *Ibid.*, p. 112.

²⁴ *Ibid.*, p. 118.

²⁵ *Ibid.*, pp. 116–17.

²⁶ *Ibid.*, p. 117.

²⁷ *Ibid.*