Paul Wilson (1992:22) conta que o termo “célula-Z” foi cunhado por Treitler neste artigo. Antokoletz (1984) depois investigou essa célula em outras obras do compositor.

learned can be demonstrated from the works of the masters in whose style such simple melodic patterns abound.

The following topics will form the content of the course: (1) chord-structure and progression; (2) the major and minor modes including inversions, sevenths chords, secondary dominants, diminished triads, and chord of the added sixth; (3) ninth, eleventh, and thirteenth chords; (4) altered chords; (5) modulations; (6) figured basses; and (7) elementary analysis of simple chorales and free settings.

An average class can easily cover the material in two terms and gain a good mastery of the discipline. This is possible because the course will avoid speculations and polemics. After a short time of close application and concentration the student will master the subject.

Artificial rigidity which often plagues the study of harmony actually hinders intelligence in students' action and volition. The ideas presented here, based on natural unencumbered voice-connections of chords, embody fundamentals proper to a required course in harmony. The essentials of harmonic knowledge are necessary tools to bridge the gap leading to the understanding of music and its processes. It is harmonic knowledge put to work, not merely worship of this knowledge for its own sake. It substitutes first-hand harmonic experience for rigidity and unrealistic practices. A harmonic curriculum planned in advance and circumscribed with esoteric examples, artificial musts and don'ts, unrealistic formulas is a course of study that may inhibit students' interest. A constructive harmonic curriculum represents what students draw from their own practices. They will realize that the great masters of music set up no laws, or formulas; that the way to learn harmony is for students to draw from their own practices the experience to achieve their purposes in solving harmonic problems. This is a course in harmony in action.

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RE: HARMONIC PROCEDURE IN THE FOURTH QUARTET OF BELA BARTÓK

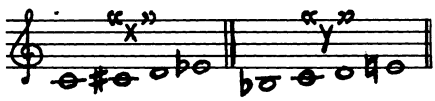
By Leo Treitler

It is the purpose of this paper to present some observations about the ways in which the music of this quartet is located around specific pitch-areas, and about the relationships that are imposed upon the pitch-groups which assume this central role.

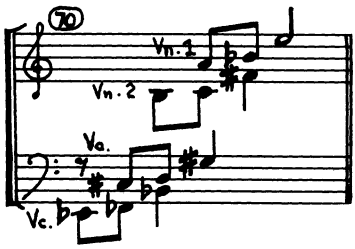
The significance of the tone C as a landmark for the quartet has been repeatedly pointed out.[3] I should like first of all to amend this to "C-in-conjunction-with-E," at least as regards some of the critical structural fulcra: the opening two notes of Movement I, before the commencement of the chromatics; the range C-E of the viola's ostinato beginning at m. 14 of Movement I; the range C-E of the chord on beat 2 of m. 26, Movement I; the range C-E of the cadential chord in the final measure of Movement I (the E^{b} and D^{b} are appoggiature); the C-E in m. 54 of Movement III, upon which this movement converges as a point

3. See Matyas Seiber, The String Quartets of Bela Bartók, (London: Boosey and Hawkes).

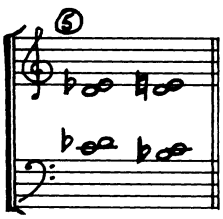
Example 1.



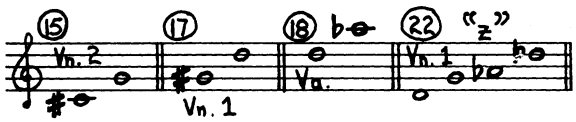
Example 2.



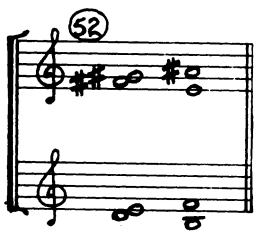
Example 3.



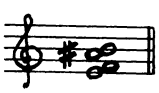
Example 4.



Example 5.



Example 6.



of repose; and the C-E range of the final measure of the piece. I shall have more to say about the reasons for considering the C and E together at the conclusion of this discussion.

But one thing must be kept entirely clear: this C, or C-E, is in no sense a tonality. It is an arbitrarily chosen, static "tonal center" which is not involved in any scheme for generating secondary tonal areas. The only implication it has, beyond this role of a static point of reference, lies in the possibility that the ear may refer sections of the quartet which deal largely with thirds and related intervals back to this prominent third.

There is, in fact, a dual approach to harmonic organization in this work. One aspect is this maintaining of a pitch or pitches as a reference; the other is a scheme which will be the subject of the remainder of this discussion.

George Perle[4] has demonstrated the use in Movement I of two basic four-tone "sets" which he labels "x" and "y" (Ex. 1, p. 292). They can readily be seen to be at work in all five movements. Both sets are used linearly to provide melody, and vertically as chords. Further, they regulate contrapuntal activity, in that canonic imitation often occurs at the intervals of a particular set so that the set can be followed diagonally across the score (Ex. 2). Finally, by being maintained at specific pitch locations, the sets can be made to act as harmonic poles. For example, the material from m. 6 through beat 2 of m. 26 (Movement I) seems to gravitate toward the tritone B^b-E, outlining the y-group in its initial locus. That is to say, while other tone-complexes are heard together with this locus of the y-group, it is the latter which repeatedly returns unchanged, and which is further marked for the ear's attention by means of rhythm, dynamics, pitch-range, and textural distinctions.

A harmonic relationship between the two sets is defined at the outset and maintained throughout. The x-group characteristically expands to the y as shown in Ex. 3. Upon hearing the first, we normally expect the second to follow. This expectation has important consequences for the harmonic events of the quartet.

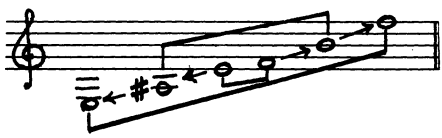
A third group emerges from melodic material in the second subject of Movement I, beginning at m. 15. Here the second violin has the range C#-G, which is imitated by the first violin at m. 17, a perfect fifth above, G#-D, and finally by the viola at m. 18, with a range that is the inversion of the latter, D-A^b. All this is summarized, or telescoped, in the first violin at m. 22 with the notes D-G-A^b-D^b. This is the first unambiguous appearance of the group I shall call "z". Its emergence is shown in Ex. 4. The z-group is related to the y as the latter is to the x; i.e., the y expands to the z, first at m. 52 and frequently thereafter (Ex. 5). The z-group has equal importance in the form shown in Ex. 5 and in that resulting from an inversion of the outer seventh, i.e. the fifth enclosing the fourth (Ex. 6). Exx. 4 and 5 show the z-group at two different pitch-locations, as it appears in m. 22 and m. 52, respectively, of Movement I. An investigation of certain intervallic properties of this group will show the relationship of these loci.

In the inverted form shown in Ex. 6, the z-group may be con-

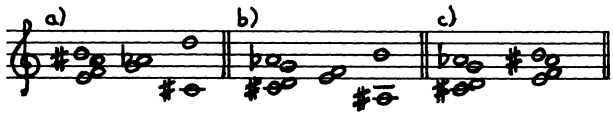
4. "Symmetrical Formations in the String Quartets of Bela Bartók," Music Review, XVI (1955), 300-12.

Reeditado em The Right Notes (Perle, 1995:189-207).
As células X e Y são apresentadas às pp. 202-3.

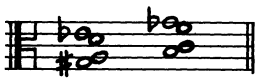
Example 7.



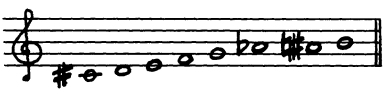
Example 8.



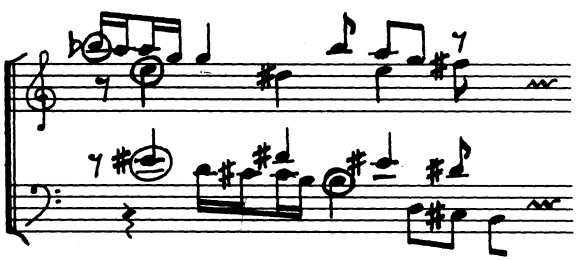
Example 9.



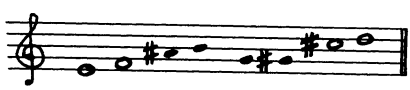
Example 10.



Example 11.



Example 12.



sidered a combination of two chromatic diads which bear to one another the following relationship: considering either diad as a center and moving outward an equal number of degrees in both directions (the distance of a tritone) we arrive at an inversion of the other diad. Continuing the movement through another tritone, we return to the initial diad, separated by two octaves (Ex. 7, p. 294).

The four-tone structure as a whole is symmetrical about the diad G-A^{b}. Proceeding as in Ex. 7, now with G-A^{b} as a center, we arrive at the new diad C#-D (Ex. 8a). This gives a second pair of diads with the same mutual relationship as the original pair. This second structure is, again, symmetrical about the diad E-F with which we began (Ex. 8b).

What results is a pair of four-tone groups (Ex. 8c) which bear to one another a relationship somewhat analagous to triads related by fifths: both constitute systems in which movement from one chord to another is regulated by an interval basic to the structure of the chords. There is this difference: In the case of triads the movement I-V, if continued, produces II, VI, etc., requiring traversal through the entire circle of fifths before a return to the point of origin is effected. V-I involves reversal of the initial motion. In the present case, because the regulating interval is the tritone, continuation and reversal are equivalent processes; the circuit is closed with two chords.

It will have been noticed that the two positions of the z-group related as in Ex. 8c) are precisely those heard in mm. 22 and 52 of Movement I (Exx. 4 and 5). The significance of this fact for the formal structure of the movement will be touched on below.

A most direct application of this relationship is found in No. 109 (Volume IV) of the Mikrokosmos, "From the Island of Bali." This piece depends entirely upon the simultaneous use and later alternation of the groups shown in Ex. 9. They constitute a pair such as is described above. (The mention of this piece is not meant to imply a Balinese origin for these harmonies; in fact the title puts one somewhat in mind of Mozart's "Turkish" music.)

To complete our view of this scheme, we must consider the eight notes of the two overlapping groups in ascending order. They constitute a scale of alternating half-steps and whole-steps (Ex. 10). It can be no coincidence that this scale is played literally for three octaves by the viola at the conclusion of Movement II, accompanied by a cello arpeggio from the same scale. Nor is it a coincidence that the scale serves as a source for melodic material; the most obvious case is the main tune of the final movement. There the connection between the scale and the z-group becomes explicit, when, at mm. 32-33, the first violin and cello play the latter outright.

The scale is a familiar Bartók sound; it can be recognized, for example, in the Out of Doors Suite, the Suite, Op. 14, the Piano Sonata, and the Cantata Profana.

Reference to a few places in the quartet will illustrate the application of these relationships.

In Movement I the tritone B^{b}-E, outlining the y-group in its initial locus, is maintained as a harmonic reference throughout much of the exposition (which ends at m. 49). But beginning at m. 37 it acquires an association with, and gradually gives way to, an x-group, C#-D-D#-E, which is the only remaining sound in mm. 47-49. This x-group, which

is already a half-step higher than the initial x-locus, is not permitted to expand to y as expected before it slides up another half-step (m. 49 and the first beat of m. 50). The y reached after this delay — C-D-E-F# (second beat of m. 50) — must now slide up a whole-step (m. 51, D-E-F#-G#) before it can make its expansion to the z-group, B-E-F-A# (m. 52). The delayed x-y and y-z expansions effected by the upward shifts of x and y are the means by which the new harmonic goal is reached. This new location of the z-group is the counterpart, in terms of the scheme outlined above, of its initial location in m. 22. In this position it will serve the development section as a harmonic focus. Bartok has here translated a traditional procedure of sonata-form into his own language.

For a typical illustration of the organizing role which this new version of the z-group plays in the development, we can look at the very beginning of that section (Ex. 11). The range of the material in mm. 54ff. extends vertically from the B^b of the first violin to the B of the cello, while the second violin maneuvers about E and the viola similarly about E#. The beginning of the recapitulation is signalled in mm. 91 and 92 by the playing of the x-group in its initial locus, C-C#-D-E^b.

Movement II appears to have for its crucial reference tones E-F (not just E, as Seiber indicates). This was the axis of symmetry of the z-group, B-E-F-A#, which initiated the development section of the first movement, and which was the counterpart of that group in its initial locus. The opening measures are organized by the inverted z-group, E-F-A#-B. The violins begin with E-F and work their way up chromatically, lingering in mm. 6-9 on A# and attaining the B at m. 10. During this ascent the viola and cello are limited by the range E-B, which shrinks gradually to the E-F of m. 10. At m. 33 the E-F axis is inverted and encloses a chord on all the white keys. E-F remains the oft-repeated focal point of the material through m. 64. At m. 65 begins a harmonic shift, the goal of which is a new central axis on C#-D at m. 68. The relationship between the two axes (E-F and C#-D) is seen in terms of the z-group (Ex. 12). The last pronouncement in the movement of the E-F axis is made in the three-bar cadence by the cello's descent from F to E.

I take the final illustration of the use of these devices from Movement V. It opens with the tune from which the z-group evolved in the first movement. This is accompanied in the cello by just such a group: C-G-D^b-F#. In mm. 42 and 43 the cello descends to a chord on A, and the violins at m. 45 play a z-group, A-B^b-D#-E. This is, in terms of the same scheme, the counterpart of the opening group, C-G-D^b-F#, and remains the harmonic base for the ensuing section through m. 72. In the latter measure the cello begins another descent which results in a return to the original group on C at 75.

The second z-group recurs in inversion (E-A-A#-D#) at m. 212-213 and serves once more as a reference. At m. 221 the cello and viola begin ostinato x-groups about the axis D#-E, the viola switching to the A-A# axis at m. 227. The initial z-group on C does not return, however. Where one might expect it there is a chord built, indeed, on C (m. 281), but composed of the fifths that have been prominent throughout the movement. There is no doubt a feeling of return to a point of origin here, but the sounds of the z-scheme have been replaced by what

can perhaps be taken to refer to the first sounds heard in the piece, the C-E. There is perhaps a reminder of the z-group in the C# which sounds as an appoggiatura to the fifths-chord. There is certainly a reminder in the tune, which is carried on until it is supplanted by the first subject of the opening movement.

It should be clear from the above that the C-ness, or C-E-ness, of this quartet is inadequate to account directly for any harmonic motion within the piece. Much of its harmonic and melodic make-up can, however, be interpreted in terms of the relationships involving the x-, y-, and z-groups. It remains now to consider what points of contact exist between the two.

First, the loci of the x- and y-groups in their initial appearances are partly bounded by the C-E center: the x-group is rooted at the bottom to C, the y is bounded at the top by E. These initial loci have the greatest consequence for the central pitch areas throughout the quartet. Thus, in the first movement the cello and viola ostinato which introduces the second subject (m. 14) is built around the y-group, B^{b}-C-D-E; the viola plays the C-D-E while the cello's figure pivots on A#. This certainly influences the pitch-location of the z-group which emerges from the second subject at m. 22 and thereby the consequent harmonic areas discussed above.

Second, the C-E provides bounds for the two key locations of the x-group in movement I: C-E^{b}, the original location, and C#-E at the end of the exposition (mm. 49-50), which has its consequences for the harmonic organization of the development section.

Finally, the z-group is directly linked to the C-center in Movement V, in that its initial location is built up from C, first in the viola, then on the same cello open-C which is heard in the first measure of the quartet.

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RE: INTERVALLIC RELATIONS BETWEEN TWO COLLECTIONS OF NOTES

By David Lewin

Throughout this paper I shall use the word "note" to denote what would be more precisely called "name of a collection of pitches differing from each other by integral numbers of octaves." Thus, in my terminology, "440 vibrations per second" denotes a pitch, "880 vibs. per sec." denotes a pitch, "220 vibs. per sec." denotes a pitch, etc.; "A," however, denotes a note. In this sense, then, there are only twelve "notes."

From among these twelve notes, we may form various collections. There are 66 collections of 2 (different) notes, 220 collections of 3 (different) notes, 12 collections of one note, one collection of 12 (different) notes, etc.

One can define the interval between the note X and the note Y as follows: take any specific pitch whose name is "X" and count upwards in semitones through the tempered scale until you arrive at the first pitch whose name is "Y." The number of semitones you have counted is "the interval between X and Y." Thus, the interval between A and C is