ANALYSES

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TONAL PROGRESSION IN BARTÓK'S *ETUDES,* OP. 18

Abstract: Bartók's mature musical language was born of both folk and art-music sources which influenced the composer in equal measure. The *Three Studies* for piano, Op. 18, represent a significant step in the evolution of the composer's synthesis of the art-music source. All three etudes are based on equal-interval chains called interval cycles. Each of the three etudes represents a stage in the process of intervallic augmentation the composer named diatonic expansion. This concept, together with that of chromatic compression, is fundamental to all his mature works. The first etude expands the chromatic scale to two whole-tone scales. In the second etude the intervals are expanded to include the minor and major thirds as well as the perfect fourth, while in the third etude the tritone becomes the final step in the expansion process. The interactions of the ever-expanding interval cycles generate an array of diatonic, non-diatonic and abstract pitch collections. Parts of the opus rely on the concept of tonal progression based on axes of symmetry, which reached its perfection in later works such as the *Out of Doors Suite* and *Music for Strings, Percussion and Celesta.*

In "Organic Development and the Interval Cycles in Bartók's Three Studies, Op. 18., Elliott Antokoletz states that the "background unifying principle in Bartók's three *Etudes,* Op. 18, is based on the systematic interlocking of the interval cycles and expanding interval ratios between semitones"[1] While this statement holds true for the entire opus, Antokoletz 's does not examine the second and

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[1] Elliott Antokoletz. "Organic Development and the Interval Cycles in Bartók's Three Studies, Op. 18. " *Studia Musicologica* 36/3-4 (1995): 249–261

third etudes in any detail. Because the continuous process toward diatonic extension occurs over the arch of the entire opus, it is essential that the latter two pieces receive the same attention given to the first. Because the single principle of diatonic extension on its own does not detail the intricate relationships that exist between the whole-tone and octatonic pitch collections of the second and third *Etudes,* this study will include an analysis of these relationships.

Once established, these collections continue to function as individual entities in the process of organic growth. This process stems from the single 1/11 and 2/10 interval cycles of the first etude to the compound cycles represented by the octatonic collections of the second and third *Etudes*. The whole-tone cycles, which unfold in the first *Etude*, generate inversionally symmetrical cyclic figurations in the opening of the second *Etude*. These local figurations, which articulate the formal structure of the *Etude*, generate a kind of musical progression based on a non-systematic use of axes of symmetry. The systematic use of axes to articulate musical progression is of fundamental importance in many of Bartók's later works such as the *Fourth* and *Fifth String Quartet*s, as well as the *Music for Strings, Percussion and Celesta.*

The three octatonic collections, already suggested in the first *Etude*, are the principal pitch collections of both second and third *Etudes.* In the second *Etude* octatonic collections are linked to one another by shared interval-3 cycles. The chromatic alteration of these shared cycles transforms one octatonic collection into another and brings about a new means of musical progression. The simultaneous use of two octatonic collections in the second *Etude* is an extension of the same principle underlying the simultaneous use of both whole-tone collections in the first *etude*. It can also be seen as a general extension of the principle of bimodality to the more abstract pitch collections.

In the third *Etude* the octatonic pitch collections unfold complete paired Z cells.[2] This is one of the principal compositional aims of his very next piano pieces, the *Improvisations* Op. 20[3] Furthermore, chromatically adjacent Z cells

[2] We will assume a referential order for a given pitch-set, the transposition number being determined by the "first" note. If we arbitrarily designate pitch-class C as 0 and assign a corresponding number from 0 to 11 for each of the notes of the chromatic scale (C = 0, C# = 1, D = 2 Eb = 3.....C=12 or 0), then, as one instance, Eb-Ab-A-D, will be designated as Z-3. Since Z-3 maintains its intervallic order at its tritone transposition, A-D-Eb-Ab, Z-9-3), we will refer to it, regardless of its contextual ordering, by both T – nos. The Z cell, together with two other types of symmetrical tetrachords (X and Y cells), are fundamental to the musical progression of many of Bartok's works.

[3] Elliott Antokoletz *The music of Béla Bartók: A Study of Tonality and Progression in Twentieth-Century Music.* (Berkeley and Los Angeles: University of California Press 1984), 103–109.

play an important part in the whole-tone transposition of octatonic sets.[4] The completion of all three octatonic collections in both second and third *Etudes* also becomes an important structural event in later works such as the *Piano Sonata*[5] and *Fourth String Quartet*.

Etude Op. 18 No. 2

The formal analysis[6] of this etude is based on changes in musical texture and developments in musical progression that are detailed throughout this study. After a two-measure introduction, which consists exclusively of a continuously expanding arpeggio, the remainder of this section consists of a melody in the lower part and accompanying arpeggii in the upper part. Both whole-tone and octatonic pitch sets, fundamental to the musical language of this etude, are presented systematically in this section. Both inversionally related whole-tone collections unfold from a common axis of symmetry that is established in the first three measures. The completion of the whole-tone cycles also coincides with the completion of octatonic collections.

The unfolding of both whole-tone collections toward the end of the first *Etude* (mm. 110-114), is initiated in the second *Etude* by two interlocked, inversionally related augmented triads, F-A-C# and Gb-Bb-D, which unfold linearly in the arpeggiations of the opening measures (mm. 1-2) (Ex. 1).

The first note of the piece, E, which extends the triad F-A-C#-[E] upward by a third, continually intrudes (to m. 3) into the symmetrical unfolding of the two whole-tone collections. Note, Eb, which is the inversionally related counterpart to the E, is sounded as a new intrusion as the first note of the bass melody. The pitch content of this measure unfolds two inversionally related segments, E-C#-A-F and D-Bb-Gb-Eb from a common Eb/E axis. This axial semitone interlocks both whole tone cycles as they move toward completion. The B and G that complete the whole-tone-1 collection are furnished by the bass melody (mm. 4-5), while the C and Ab that complete the whole-tone – 0 collection are furnished by the melody (m. 4) and the accompaniment (m. 5). The whole-tone cycles are completed by the systematic interlocking of their component interval – 4/8

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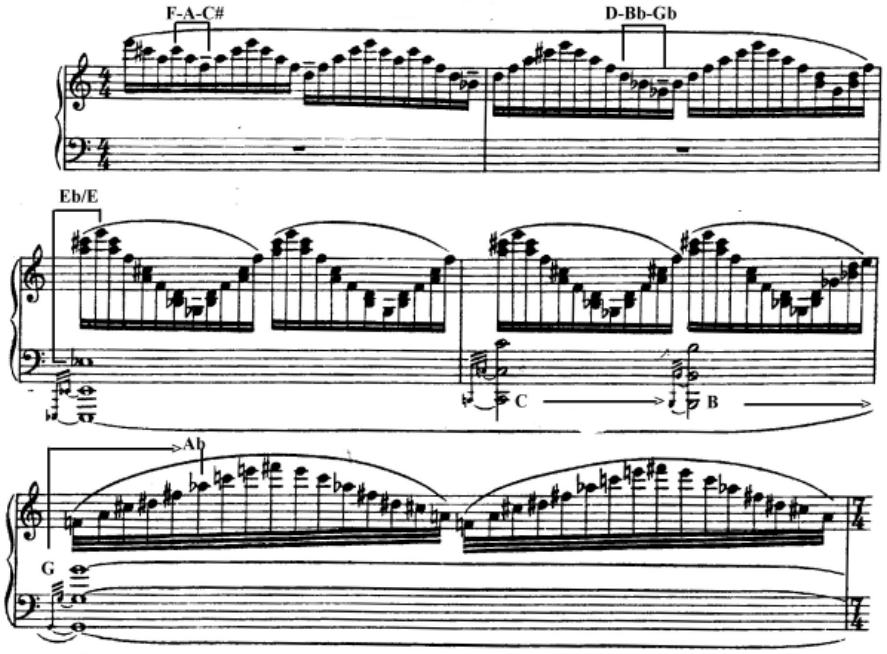
[4] In Etude III, Z 5/11 (F-Bb-B-E) progresses to Z-3/9 (Eb-Ab-A-D) by the way of Z-4/10 (E-A-Bb-Eb). The movement from Z-5/11 to Z-3/9 represents the whole-tone transposition from an octatonic-2 collection to an octatonic-0 collection.

[5] Paolo Susanni "The Musical Language and Formal Structure of Bartók's Sonata for Piano (1926)". (D.M.A treatise. University of Texas, 2001), 7-9.

[6] The formal structure is as follows: **A** (mm. 1-12), **A'** (mm. 13-27), **B** [Cadenza] mm.27-29), **A"** (mm. 30-40), **Coda** (mm. 41-46). Since there are several striking similarities between the **A** sections, the large-scale formal structure can be condensed to an **A-B-A** plan.

cyclic segments, F-A-C# plus Eb-B-G of whole-tone 1, and Gb-Bb-D plus E-C-Ab of whole-tone – 0. In both cases the second of the two segments is given in reverse order. With this orderly completion of the whole-tone cycles, the bass melody (mm. 3-6) yields two inversionally related segments, B-C-Eb (mm. 3-4) and B-Bb-G (mm. 5-6). This is a direct duplication of the axial unfolding of the two interval-2/10 cycles of the opening measures.

Example 1. *Etude Op. 18 No. 2*, **mm 1**



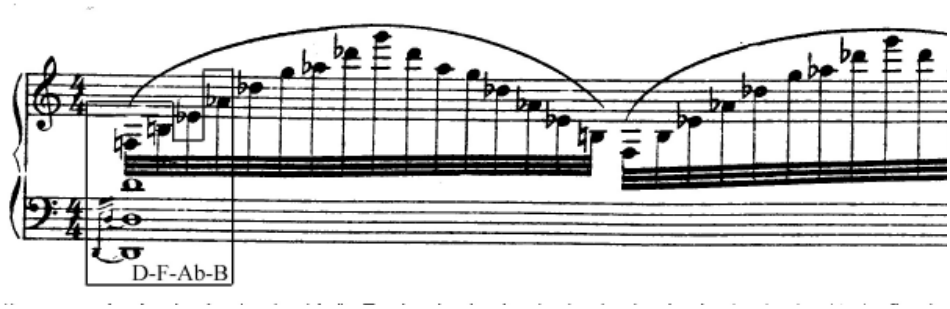
In this case, however, the two interval- 3/9 cyclic-segments, C-Eb and Bb-G, which are generated as part of the process, allude to the formation of an octatonic collection through the interlocking of two interval-3/9 cycles (C-Eb-Gb-A and C#-E-G-Bb) separated by a semitone. When combined, they form the octatonic -1 collection C#-Eb-E-Gb-G-A-Bb-C.[7] The unfolding of these cycles extends the process of diatonic expansion that began in the *First Etude* that began with the partitioning of the interval-1/11 cycle into the two interval 2/10 cycles.

[7] The three octatonic scales are octatonic-0 (C-D-Eb-F-F#-G#-A-Bb-C), octatonic-1 (C#-D#-E-F#G-A-Bb-B-C#), and octatonic-2 (D-E-F-G-Ab-Bb-B-C#-D). The numbers are retained irrespective of scalar rotation or permutation.

The initial pitch content (mm. 1-2) can also be seen as two incomplete octatonic-2 and octatonic-1 collections, C#-D-E-F-[ ]-[ ]-Bb-[ ] and [ ]-C#-[ ]-E-Gb-[ ]-A-Bb. These two octatonic collections have in common the complete interval-3 cycle, C#-E-G-Bb.

The last five notes of m.6 signal a change of octatonic sets by interlocking two segments (F-Gb-Ab-C and E-F-Ab) of a new pair of incomplete octatonic collections, namely octatonic-0 and octatonic-2, respectively. The interval-3/9 cyclic- segment, F-Ab, is extended by two of the first three notes of the following measure (m. 7), D and B, establishing the completed interval-3/9 cycle, D-F-Ab-B, as the common link between the expanded octatonic-0 (F-Gb-Ab-[ ]-B-C-D-[ ]) and octatonic-2 (E-F-[ ]-Ab-[ ]-B-[ ]-D) segments (Ex. 2).

Example 2. *Etude Op. 18 No. 2*, **m. 7**

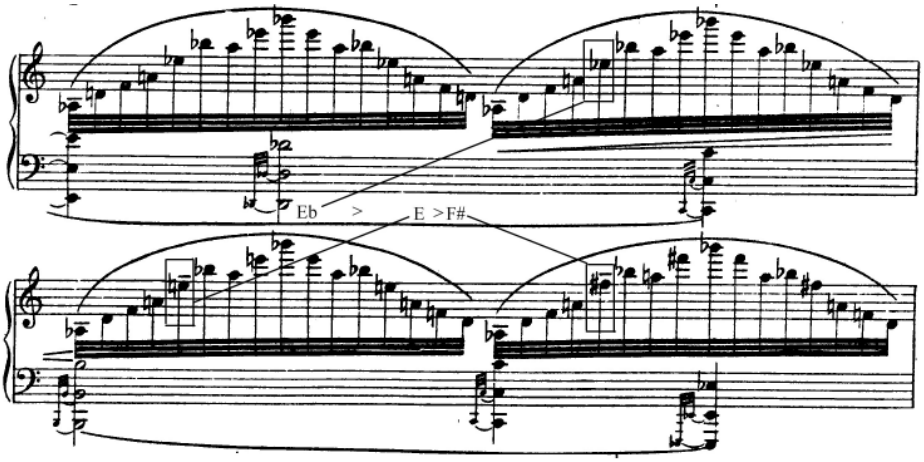


The ostinato arpeggio (mm. 7-8) describes the alternation of three-note segments the two octatonic collections (F-B-[Eb] and Ab-[Db]-[G]) respectively each collection missing only one note (F-Gb-Ab-[ ]-B-C-D-Eb and E-F-G-Ab-[ ]-B-Db-D). The two missing notes, A and Bb are furnished by the first two notes of the melody (m. 8.).

A similar process of combining and completing begins anew in mm. 9-11. This time, three of the four notes of the complete interval- 3/9 cycle (C-Eb-[ ]-A) interlock the final pair of octatonic collections i.e., octatonic-0 and octatonic-1. The only changing element within the arpeggii (mm.10-11) is a linear octatonic ascent, Eb-E-F#, which furnishes the missing cyclic note, F# . (Ex. 3) This is a striking anticipation of an analogous compositional technique adopted in the third movement of the *Music for Strings, Percussion and Celesta*.[8]

[8] Elliott, Antokoletz. The Music of Béla Bartók: A Study of Tonality and Progression in Twentieth-Century Music. Berkeley and Los Angeles: University of California Press, 1984. 184-197.

Example 3 *Etude Op. 18 No. 2*



The melody returns to the three notes with which it started, Eb-C-B (mm. 11-12). This time however, they are presented in reverse order (B-C-Eb), thus signaling the end of the second section. By the end of the section (m. 12) Bartók unfolds the entire chromatic continuum, both interval-2 cycles, all three interval-3 cycles and all three octatonic collections. The octatonic collections are presented in a succession of pairs, in which the second pair retains one of the subcollections of the first pair and the third pair retains one of the collections from the second pair to form the sequence, octatonic 1-2, 2-0, and 0-1. All three interval-3 cycles are of great importance in the development of the following section (m. 13 ff.)

The registral inversion of arpeggios and melody i.e., as invertible counterpoint, signals the opening of this section. The transformations of the octatonic scales through the alteration of the component interval-3 cycles generates the musical progression of these measures. Toward the end of the section, the whole-tone collections emerge once again, reestablishing their coexistence with the octatonic collections. The alterations of the octatonic collections create diatonic chord progressions that further the process of organic growth not only on the micro level, of the piece, but on the macro level as well.

The arpeggio (mm. 13-14) unfolds [ ]-D-[ ]-F-F#-Ab-A-[ ]. The melodic segment, B-C-Eb (m. 13), completes the octatonic-0 collection. Notes Eb and C are melodically raised to E and C# (m.15). The accompaniment (m. 15) immediately furnishes the cyclic notes A# and G within the first arpeggiation. However, their occurrence within the arpeggio is not orderly. The systematic

unfolding of the missing cyclic notes is outlined by the first and last note of the descent, described by the second note of each arpeggio, A#-A-Ab-G#-G, (mm. 15-17). The process of chromatically raising one of the two interval-3 cycles of the octatonic-0 collection is clarified. In so doing, octatonic-0 is transformed into octatonic-2**,** confirmed by the exclusive octatonic-2 pitch content of the first half of m. 16. (Ex. 4)

Example 4. *Etude Op. 18 No. 2* **mm. 14-17 (first half)**

Octatonic-0:	(C) - D - (Eb) - F - (F#) - G# - (A) - B
single interval-cycle 3 raised	C# --------E --------- G --------- A#
Octatonic-2:	C# - D - E - F - G - G# - A# - B

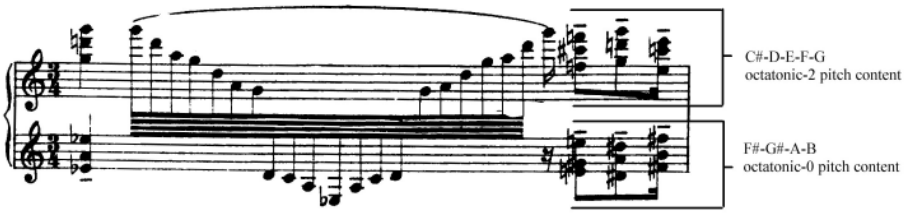
This procedure is repeated (mm. 16-18), where the melody (mm. 16-17, downbeat), unfolds the incomplete cyclic segment, A-F#-[ ]-C, completed by D# (m. 17) in the accompaniment, which unfolds the D# in the same register as that of the melody. Thus, the chromatic raising of the interval 3/9 cycle, D-F-Ab-B to D#-F#-A-C, transforms octatonic-2 into octatonic -1.

The C#-D#-E-F#-G-A segment of the octatonic-1 becomes an accompaniment arpeggio (mm. 20-22). Above this accompaniment, a five-note segment, Bb-Ab-D-F-C, is stated three times prior to being given in its ascending scalar order, C-D-F-Ab-Bb (m. 22). This segment contains four notes of the whole-tone 0 collection (C-D-[F]-Ab-Bb). The note F (m. 23) is raised to F# to yield the WT-0 segment [ ]-D-F#-G#-A#. The accompaniment in the arpeggio (m. 24) unfolds WT-1 segments, sounded in scalar order (F-[ ]-A-B-C#-Eb) directly before the sounding of the WT-0 segment (Ab-Bb-C-D-[ ]-[ ]) (mm. 24-25). The trill (m. 26), an incomplete octatonic-2 segment G-Bb-Db-F, is countered by an incomplete octatonic-0 collection spelled out in terms of its tritones, F#-C, G#-D, and A-Eb. For the second time in the Etude, octatonic-2 is juxtaposed with octatonic-0. This time, however, chromatic alterations of the incomplete octatonic collections transform these into diatonic segments, which further the process of organic growth .

In the chordal progression of the bass (m. 26), the note F, required to complete the octatonic-0 collection**,** F#-G#-A-B-C-D-Eb-(), is replaced by a single

E in the same measure. When the progression resumes (m. 27, bass), the incomplete octatonic segment D#-()-F#-G#-A-B is transformed into the diatonic segment D#-E-F#-G#-A-B. This segment is partitioned into three clearly defined chords, E-G#-E, D#-A-D#, and F#-B-F#. When combined, the latter two form the major/minor seventh chord, B-D#-F#-A, which alternates with the E-G#-E chord in a V7-I pattern. The treatment of the incomplete octatonic-2 collection that occurs in the top register of the same measure (m. 27) differs only in that the C# is maintained in alternation with C of the octatonic-2 segment, C#-D-E-F-G. Again, the V7-I pattern is established between the E-C-E and the somewhat impure G-[C#]-D-F chords (Ex. 5)

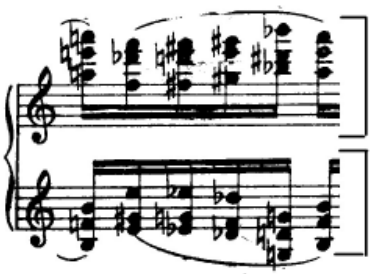
Example 5. *Etude Op. 18 No. 2*, **Cadenza.**



The cadential patterns of this section are the clear indicators of the move toward diatonicism already begun in the first *etude*. The impurities of the second set of cadential chords indicate that the process is not complete because the diatonic and more compressed octatonic sets are intertwined, thus restricting the process. The completion of the process of diatonic expansion is realized in the third *etude* when the interval-5/7 cycle emerges in its pure form. With the melody absent, the texture of this section consists of an extensive succession of chords that continue the diatonicism previously established. However, it is in the cadenza that the whole-tone scales reemerge from the diatonic passage to foreshadow the return (m. 30) of the opening whole-tone arpeggios.

Following the introduction to the cadenza (m. 27), the chords in the two registers at the end of the measure continue in their established ostinato sequence until they begin to move in opposite directions. The whole-tone pitch content of the top register chords, [D]-Eb-F-G-A-()-[C]-Db-Eb-[E], contains five linearly adjacent notes of the whole-tone-1 collection (Eb-F-G-A-()-Db). The whole-tone pitch content of the bottom register chords [F]-F#-G#-A#-[B]-[ ]-D-E-[F], contains five notes of the whole-tone-0 collection (F#-G#-A#-()-D-E). In this case however the whole-tone movement is found in the inner voice of the chords that outlines the whole-tone segment A#-G#-F#. (Ex. 6)

Example 6. *Etude Op.18*, **Cadenza**



Of the notes that render the individual whole-tone collections impure (D, C, and E vs. the whole-tone – 1 collection and B and F vs. the whole-tone – 0 collection), the D and F form the boundary of a series of slurred figures. These two notes are symmetrical around the Eb/E axis of the opening which is now reestablished through assertion. This prepares the return of the opening arpeggios that unfold symmetrically from this Eb/E axis.

The melody – arpeggio texture returns, but is considerably varied. The melody shifts to different registers through a series of octave displacements while the arpeggios move in every direction often overlapping the notes of the melody. The initial Eb/E axis of symmetry is reestablished and clarified through literal inversion of the arpeggiated figures. The axial concept extends systematically to include other axes at different sums.[9] The return of axes not only confirms the axial concept as a means of musical progression, but also delineates the formal structure of the piece.

The arpeggiation, now in a four-voice texture (mm. 30-31), returns to the opening material. While the octatonic sets are renewed in the same manner of the opening (mm. 32-34), the axial idea is brought back and developed. In the same way that the Eb/E forms the axis for the two segments Eb-Gb-Bb-D and F-A-C#-E (m**.** 32), a Bb/B axis lies between the two inversionally related segments Bb-Db-Gb-A and C-Eb-Ab-B (m. 36). The single octaves (m. 40) outline the incomplete octatonic-1 segment, C#-[ ]-Bb-A-[ ]-F#-[ ]-[ ]

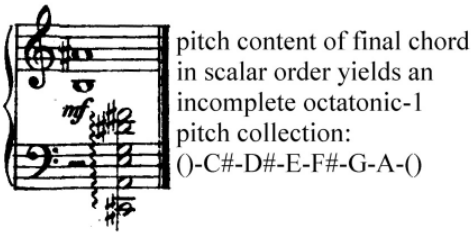
The same texture of the A' section returns in the coda. The melody is in the upper part and is accompanied by the arpeggiation in the lower part. The mel-

[9] Any collection of two notes is symmetrical because they can be shown to be equidistant from an imaginary axis of symmetry. If one assigns a numerical value to all twelve notes of the chromatic scale, where C = 0, C# = 1, D = 2.....C = 12 or 0, then one can calculate the sum of complementation of any two notes around the axis. For example, if D = 2 and F# = 6, the axis of symmetry is at sum 8. The sum is a convenient means of representing the axis of symmetry. All dyads of the same axis will have the same sum.

ody (mm. 41-43) supplies three new notes (E, G, and D#), which contribute to the completion of the melodic octatonic-1 collection (begun by the octaves of m. 40) so that by the end of m. 43, the collection consists of C#-D#-E-F#-G-A-Bb-[ ]. While the melodic E (m. 41) completes the WT-0 collection (C-D-[ ]-F#-G#-A#), of the accompaniment, the C of the accompaniment completes the octatonic-1 collection of the melody. The coexistence of whole-tone and octatonic collections is achieved.

The final three measures return to the octatonic-1 and octatonic-2 collections confirmed by the final octatonic chord, C#-A-E-G-D#-F#, together with dyad B-A#, which immediately precedes the chord in the final measure. The dyad outlines the boundary of the octatonic-2 collection. The octatonic-1 and octatonic -2 collections are the ones that are first unfolded and interlocked at the beginning of the piece (Ex. 8).

Example 8. *Etude Op. 18 No. 2*, **final measure**



In the second etude, the means of progression is based on the interaction of octatonic pitch sets and their component cycles. This is underlined by the imminence of literal symmetry not only in the large scheme of focal points but in the local textures as well. The Eb/E (sum 7) axis, which is created by the first note of the bass melody against the accompanying arpeggios (mm. 1-3), seems at first to be an isolated event. However, an analogous sounding of C/C# (sum 1) and G/F# (sum 1) by the ensuing bass melody and accompanying arpeggios (mm. 4-5) provides the second of the two odd axes of the octatonic-1 scale.

The octatonic - 1 scale is the first to be completed in these measures. The completion of the octatonic-0 collection that takes place at the beginning of the second section (mm. 7-12) is initiated (m. 6) by a shift to sum 5, represented by the high G of the arpeggio and the Bb of the melody . This sum represents one of the odd axes of the octatonic-0 scale. The final two measures that end this section on the repeated B/Bb of the melody and harmony are at sum 9. Toward the end of the third section, there is a return to the sum 1 axis (m. 17), repre-

sented by the C#/C of the linear and vertical dimensions. This is reinforced at the beginning of the trill section (mm. 20ff.), where the upper note of the trill, C, is juxtaposed by the C# of the accompanying arpeggio. After the preliminary reestablishment of the Eb/E axis in the cadenza (m. 28), the recapitulation (mm. 29 ff.) opens with the arpeggio that rotates around that same Eb/E (sum 7) axis. This time however, the axis is created by the literal inversion around the Eb/E axis. This focal point is also the key structural point as it highlights the beginning of the final section of the etude's ABA structure. In an analogous manner, the arpeggii (m. 36), C-Eb-Ab-B in the right hand and Bb-Db-Gb-A, together, are symmetrical around a Bb/B axis at sum 9. In the opening (mm.1-6), the complete interval-3 cycle (C#-E-G-Bb) common to the octatonic-1 and octatonic-2 collections, is represented on the background level by C# and E (m.1f.) of the arpeggio and the G and Bb of the melody (m. 6). The odd axial dyads (F/F#, G#/A, B/C, and D/D#), around which the complete compound cyclic collection can be permuted, are the two axes of symmetry at sums 11 and 5. These two sums also represent the odd axes of the octatonic-0 collection. The interval-3/9 cycle (C#-E-G-A#), whose presence is implied by the prominently placed C# and A# (mm. 45-46) ends the piece at sum 11, one of the two odd axes of octatonic-0. This octatonic collection opens the third etude and is the first to be completed therein.

Etude Op. 18 No. 3

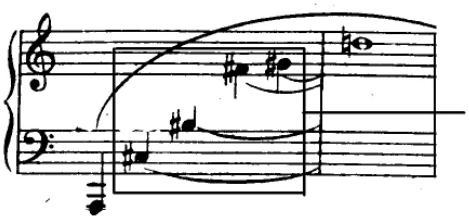
The musical texture of this etude, which consists of a continuous accompaniment in the lower part punctuated by chords in the upper part, is interrupted briefly (mm. 38-51) in the middle of the piece by a melody that is shared between the two parts and seems therefore to be a large-scale formal clarifier that takes on a central structural role. Since changes of musical texture are infrequent, one must look more to the repetition of accompaniment figurations and transformations of pitch sets within the texture in order to define the formal structure of the piece. In doing so one might arrive at the following symmetrical formal scheme: Introduction- A-Transition-A'-B-Transition-A"-Codetta.[10] This formal symmetry is confirmed by the coda that restates the same French augmented sixth chord (G#-B#-D-F#) of the Introduction as well as the beginning A' section, which replicates the same notes of the A section two octaves lower.

The opening figure (mm. 1-3, first beat), A-C#-B#-F#-G#-D, contains the French augmented sixth chord, G#-B#-D-F#. This chord is made up of two

[10] Introduction (mm. 1-4), A (mm. 5-23), Transition (mm. 24-37), B (mm. 38-52), A'(mm. 58-74), Codetta (mm. 74-77).

whole-tone related cyclic interval segments (B#-D and F#-G#), two cyclic interval- 4 segments (G#-C and D-F#), and two interval-6 cycles (G#-D and C-F#) (Ex 10).

Example 10. *Etude Op. 18 No. 3* **mm.1-2**



The presence of these cyclic segments makes both whole-tone and octatonic elaborations of the opening figure possible. The presence of C# only increases the octatonic possibilities because with it, the figure furnishes four notes to each of three pitch collections, that is WT 0 (B#-D-[]- F#-G#-[ ]), octatonic-0 (B#-D-[ ]-[ ]-F#-G#-A-[ ]), and octatonic-1 (B#-C#-[ ]-()-F#- [ ]-A-[ ]) Two new notes (E# and Fx), which are added to the repeated figure (mm. 3-4, downbeat), start to fill in both octatonic collections (B#-D-()-E#-F#-G#-A-[ ] and B#-C#-[ ]-[ ]-F#-Fx-A-[ ]), respectively.

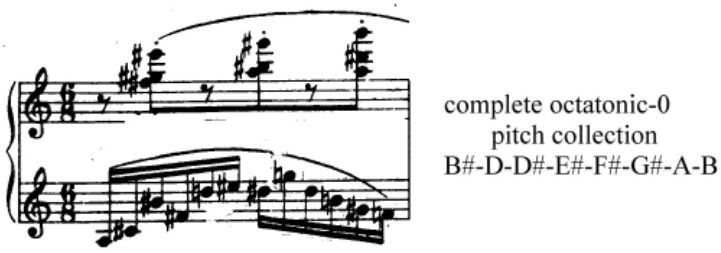
Cell Z appears (mm. 5-18) in its incomplete form and eventually emerges not only in its complete form but in an interlocking chain that allows for a systematic transposition of the octatonic collections. The octatonic collections unfold at a much faster rate than in the second *Etude* because of the rapid manner of transposition afforded by the accompaniment. The accompaniment is also the focal point of most of the musical activity because it is the part that unfolds the majority of pitches that make up the different pitch sets.

At the opening of this section (mm. 5-6), the pitch content remains unaltered. However, the repeated E#-F#-G# chord in the top register suggests a move toward the octatonic-0 collection by the addition of D# and B to the accompaniment figure (m. 7). This completes the octatonic-0 collection (B#-D-D#-E#-F#-G#-A-B) and, at the same time, adds the D# to the octatonic-1 collection (Ex. 11).

The completion of octatonic-0 is also defined by the last chord of m.7, A-D#-B, which when considered in conjunction with the note F directly below it in the accompaniment, unfolds the French sixth A-B-D#-F, the octatonic-0 complement of the initial French augmented-sixth chord (m. 1). It is no coincidence that the very next chord, A#-E-B# (m. 8, downbeat), which results from

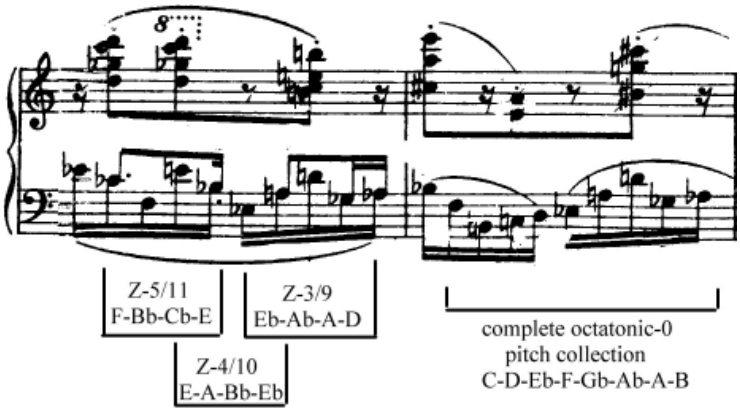
the chromatic raising of the A-D#-B chord, completes octatonic-1 by furnishing its missing tritone, A#-E.

Example 11. *Etude Op. 18 No. 3*, **m.5 – 7**



The major seventh and tritone components of the next two chords, G#-A-D and E-F-B (m. 8), suggest the presence of incomplete Z cells. Beneath these chords the accompaniment unfolds two incomplete Z cells (Z-0/6 ,C-F-[ ]-B, and Z-10/4, Bb-Eb-[ ]-A). These two Z cells are interlocked by Z-11/5 (B-E-F-Bb).The three cells are therefore interlocked at the semitone. The chromatic interlocking of Z cells is repeated (mm. 10-11) where Z-10/4 (A#-D#-E-A) is interlocked with Z-8/2 (G#-C#-D-Fx) by an incomplete Z-9/3 (A-()-D#-G#). The process is clarified (mm. 11) when Z-5/11 (F-Bb-B-E), Z-4/10 (E-A-Bb-Eb), and Z-3/9 (Eb-Ab-A-D) are unfolded in their complete form (Ex.13).

Example 13. *Etude Op. 18 No. 3*, **mm. 11-12**



The transposition of entire octatonic collections by whole-step was already suggested in m. 8, where the entire musical texture moved down by whole-tones. The accompaniment of this measure also completed a WT-0 collection in its descent.

The octatonic-1 collection is kept in the accompaniment (mm. 12-14) and transposed down to octatonic-0 (m. 15) where it dissolves into a chromatic ostinato (mm. 16-18).

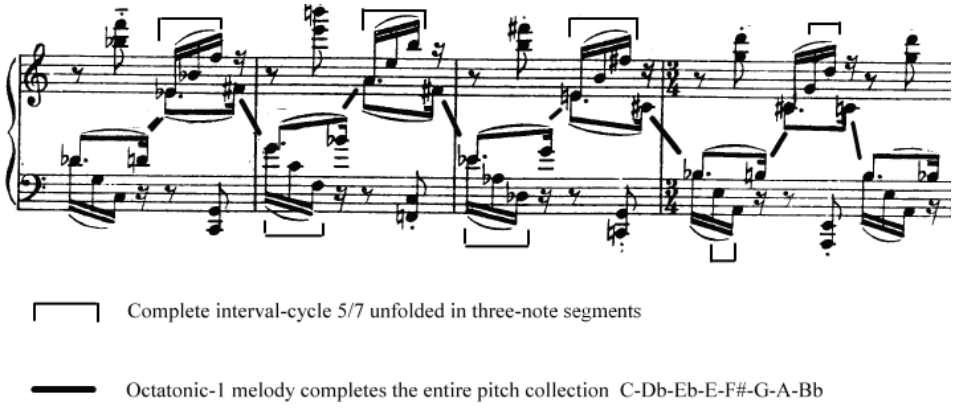
Above the chromatic ostinato of the ensuing transition, chordal segments G#-A#-B and Db-E-F alternate with one another to establish the octatonic-2 collection (mm. 19-22), which is finally punctuated by an incomplete Z-5/11 (F-[ ]-B-E) arpeggio. During this transition (mm. 19-22), the chromatic accompaniment discloses an octatonic-1 segment, Bb-C-[ ]-Eb-E (m. 20), the complete WT-1 collection (m. 20), and an octatonic-2 segment (Ab-Bb-B-Db-D-E-[ ]-G) completed by the F of Z-5/11 (m. 22).

The interlocking of segments from paired octatonic collections is the structural focus of the next section (mm. 24-37). The complete pitch content (m. 24, first four sixteenth notes) yields the lower segments of octatonic-1 (C-C#-D#-E-F#) and octatonic-0 (C-()-D#-F-F#), which are intercalated by semitones, the same process by which two interval-2 cycles were interlocked in the first Etude. By the end of the measure (m. 24) the octatonic-0 collection is complete, while octatonic-1 requires only a G#, which is furnished by the accompaniment (m. 26). The octatonic-1 collection (m. 29-33), defined by incomplete Z-4/10 (E-[ ]-A#-D#) statements in the top register, is maintained and interlocked with an incomplete octatonic-2 segment (C#-D-[ ]-E#-G) in the final beats of mm. 29-30. The octatonic-2 collection, characterized by incomplete Z-11/5 statements (B-E#-A#), is completed in m. 34. This Z cell is emphasized (mm. 36-37) over an ostinato accompaniment (D-E-G), extracted from the octatonic accompaniment of the previous two measures.

The following passage (mm. 38-52) represents the final stage of organic growth toward the interval-5/7 cycle which represents the culminating stage of diatonic expansion . The unfolding of the 5/7 cycle occurs around the only clearly discernible melody of the etude. The melody thus serves a dual purpose i.e., culmination point of the organic growth process and formal clarifier.

The interval- 5 cycle segments, D-G and E#-A#, from accompaniment and Z cell, form the starting point in the unfolding of the complete 5/7 cycle (mm. 38-42), which occurs in ordered three-note segments and their respective cycle 5/7 dyads. The unfolding of the 5/7 cycle is anchored to a central octatonic-1 melody that completes the entire octatonic-1 collection (mm. 38-41) (Ex. 14).

Example 14. ***Etude Op. 18 No. 3*****, mm. 38-41**

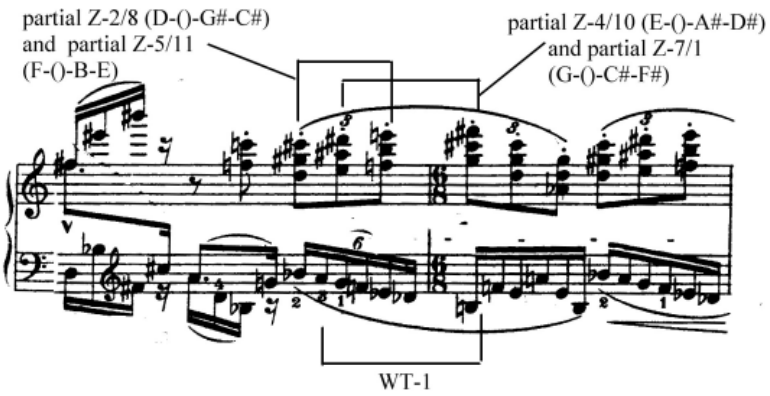


The octatonic melody (mm. 44-51) intrudes into the three-note cyclic-interval 5/7 segments to create a three-layered texture where each of the layers represents a single octatonic collection. At the end of this passage (m. 48-49, downbeat), the complete octatonic-0 collection (C-D-Eb-F-Gb-Ab- A-B) emerges.

At the point in which the melody ceases (m. 51, second beat) the top and bottom parts once again assume their individual places. The top part begins a series of incomplete Z statements, which alternate in the following manner: Z-2/8 to Z-5/11, and Z-4/10 to Z-7/1 (mm. 52-53, downbeat). The incomplete alternating Z cells outline incomplete octatonic collections. Z-2/8 (D-[ ]-G#-C#) and Z-11/5 (F-[ ]-B-E) outline the incomplete octatonic-2 collection (C#-D-E-F-[ ]-G#-[ ]-B), while Z-4/10 (E-[ ]-A#-D#) and Z-7/1 (G-[ ]-C#-F#) outline the incomplete octatonic-1 collection (C#-D#-E-F#-G-[ ]-A#-[ ]). When sequentially paired, the Z pairs ascend by whole-tone. The whole-tone movement is directly reflected by the descending whole-tone-1 scale (A-G-F-Eb-Db-B) that accompanies these four Z cells transpositions. The G and A of the whole-tone-1 collection supply one note to each of the octatonic collections (Ex. 15). The Bb in the descending scalar figure, while not belonging to the whole-tone scale, nevertheless completes the octatonic-2 collection.

Partial Z-3/9, which represents the final octatonic-0 statement, is eventually introduced (m. 55, second beat), thus preparing the way for the recapitulation (mm. 58ff). The component intervals of the partial Z cells (intervals 5 and 6) of this passage and those of interval-5/7 cyclic segments (intervals 7) of the previous passage represent the state of maximum expansion in the process of organic growth.

Example 15. ***Etude Op. 18 No. 3*****, mm. 51-53**



The first measure if the quasi-recapitulation (m.58) is a replica of the seventh measure of the opening. This signals the return to octatonic-0. The contents of the entire measure are transposed several times (mm. 59-61) in a sequence that unfolds seven-note segments of all three octatonic collections. The entire pitch content of m. 58 is replicated in m. 68) and slowly subjected to a process of fragmentation (mm. 68-73).

The bass chords and pedal notes of the beginning at the codetta (mm. 74-75) yield the incomplete octatonic-2 segment, C#-D-E-F-G-G#-[ ]-B, which is followed immediately (m. 76) by the opening French augmented-sixth chord, B#-F#-G#-D (= D-F#-G#-B#), from octatonic-0. This is the final whole-tone transposition of the octatonic set. The Etude closes (m. 77) with a partial Z cell [C#-G-B#]. "The last two measures juxtapose whole-tone (B#-F#-G#-D-Bb), pentatonic (D-Bb-F-G-B#), and Z cell (G-B#-C#) segments, cell Z representing the largest gap of semitones at ratio 1:5."[11] These two measures summarize the entire process of organic growth begun in the first etude. In the first *etude* the chromatic scale was partitioned into the two whole-tone cycles. In the second *etude* the particular interlocking of the two whole-tone cycles allowed the unfolding of the octatonic collections that persisted, together with the whole tone cycles, to the end of the opus.

In these etudes, the interaction of pitch sets within the process of organic growth represents a new means of progression. The second and third *Etudes* extend, expand and transform the process begun in the first *Etude*. The single cyclic-interval partitions (interval 1/11 and 2/10 cycles) of the first Etude are

[11] Elliott Antokoletz. "Organic Development and the Interval Cycles in Bartok's Three Studies Op. 18." Studia Musicologica 36/3-4 (1995): 260.

combined to form the compound cycles (octatonic scales) in the second and third *Etudes*. In the second Etude, the transformation of one octatonic set into another is achieved by the systematic lowering of one of the component 3/9 cycles of the octatonic set. The 3/9 cycles are significant in that they not only represent an intermediary stage of organic growth, but the means by which musical progression occurs. In the third Etude the octatonic sets generate the Z-cell statements that demarcate the penultimate stage of diatonic expansion and the unfolding of the cyclic - 5/7 segments in the same Etude. The chromatic interlocking of Z cells underlies the whole-tone transposition of octatonic sets in this etude.

These etudes mark a significant point in Bartók's compositional development and are also a milestone in the development of the piano etude as a genre. The *Etudes* Op. 18 were amongst the first to be written in the new musical language of the twentieth century, a language based on the equality of the twelve tones, often void of tonal references. While in keeping with the tradition of exploring certain pianistic techniques, the *Etudes Op. 18* deal mainly with new kinds of sonority, and in this sense, they follow the early twentieth-century aesthetic ideal inaugurated by the etudes of Scriabin and Debussy.

The musical language of the *Fifteen Hungarian Peasant Songs* bears little resemblance to that of the *Etudes*, which were being composed at the same time. While the *Fifteen Hungarian Folk Songs* are based on the modes of folk song, the *Etudes* are based on the more abstract whole-tone and octatonic collections. The former pieces contain strong tonal references while the latter tend toward atonality. This apparent inconsistency can be explained if one examines Bartók's experimental tendencies as well as the musical influences exerted on him by the music of other composers.

Bartók had already begun to experiment with the concept of an axis of symmetry in the *Fourteen Bagatelles* Op. 6*,* specifically *No. 2*.[12] Though not completely systematic, the axial concept is developed significantly in the second of the *Op. 18* etudes, in which it establishes the use of axes as a new means of tonal and formal delineation. In the *Suite Op. 14* the systematic use of simple and compound interval cycles, i.e., the whole-tone cycles in *No. II* and octatonic sets in *No. III,* predates the *Etudes* by four years. In the *Suite* the whole-tone cycles and octatonic sets are used individually. In the *Etudes Op. 18,* they are combined and developed to create a new means of progression.

The influence of Debussy's piano writing is clearly visible and audible in the second of the *Etudes,* especially with regard to the use of whole-tone scales

[12] Elliott Antokoletz. "The Musical Language of Bartoks 14 Bagatelles for Piano." Tempo 137 (June 1981) : 8-16.

in extensive arpeggiations. While the individual sonorities exhibit some affinity to Schoenberg, given their atonal bent, the repetition of entire musical figurations gives this etude some form of asserted tonal essence. The *Etudes* Op. 18 foreshadow the Etudes of Ligeti in their use of interval cycles and asymmetrical rhythms. The sonorities of the cadenza of the second *Etude* are echoed by those of many of Messiaen's piano works.

While the musical language of the *Etudes* Op. 18 demonstrates strong historical influences, it points to the future and, to date, these etudes remain the only ones based on the process of organic growth.

Summary

The *Three Studies* for piano, Op. 18, systematically articulate the use of continuously expanding interval cycles that generate diatonic, non-diatonic and compound cyclic pitch collections. The generation and interaction of these pitch collections represent a significant development in the evolution of Bartók's personal musical language. The use of tonal progression based on axes of symmetry would become a hallmark of the composer's later works. The compositional techniques used in these etudes would be of great influence on a large number of twentieth-century composers.