WEBERN'S LABYRINTH: CONTOUR AND CANONIC INTERACTION– An Analysis of Webern's Op. 16, No. 2

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WEBERN’S LABYRINTH: CONTOUR AND CANONIC INTERACTION
An Analysis of Webern’s Op. 16, No. 2

by

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of the requirements for the degree of
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The expressionism seemed logical, the atonality inevitable, but then a dead end. Where do [sic] one go from here? Having abandoned all the rules. For one thing, the lack of constraints, and the resulting ungoverned freedom produced in music that was extremely difficult for the listener to follow, in either form or content. And, this remained true, in spite of all the brilliant and profuse inner structures to be found in this piece: canonic procedures, and the inverted phrases, retrogrades, and all the rest.¹

Introduction

Pitch-class set analysis is one of the most accepted analytical systems for serial and dodecaphonic analysis. The system allows one to understand formulas and tone-collection occurrences, and often represents a visual way to analyze certain post-modern music; however, recognizing pitch-class set analysis as the primary method for serial and dodecaphonic analysis is a disservice to the conceptualization, and to the integrity, of post-modern musical architecture. As an active music theorist, I wholeheartedly accept and utilize pitch-class methods for analysis; however, I consider the fact that post-modern music conceptualization does not revolve around only one analytical method. In many cases, pitch class is not sufficient to understand the full construction of the music. If post-modern analysis does not necessarily require pitch-class methodology as the fundamental approach for comprehension, it would seem valuable to recognize analytical models other than pitch class. Since pitch class focuses on only pitches and intervallic content, it cannot be utilized for measuring musical features that exist under arbitrary tone collections, such as contour.

Contouric analysis is a rather new field. The recent rise in attention given to contouric analysis has prompted theorists, such as myself, to further investigate the

contouric interaction in a score. It is my belief that contour can influence musical features in a score, such as canons and form, and, therefore, it is my intent to generate a comprehensive representation, and an understanding of contouric influential potentiality, in order to accept contour as an influential device. I suggest contour should be universally recognized as an accepted influential device for features and systems of music other than melody. In order to promote this suggestion, I will thoroughly examine and provide an analysis* of Webern’s Op. 16, No. 2.

*Reference to Figure 13.

The architecture of this movement is influenced by contouric design, by permitting a contour to be severed into individual cells—Subcontouric Cells, which can, then, be manipulated by rotation—Prime Form, Retrograde, Inversion, Retrograde-Inversion—reversed placement, and Counter Polarization; these cells aggregately remain together in permutations with the intent to be associated with the original contour.
Recognition of contouric interaction can offer theorists a new analytical modus operandi, as well as afford theorists a better understanding of apparent and hidden notated occurrences. The hidden occurrences to which I am referring are any musical features or patterns that are generated as a byproduct of the contouric interaction. Even though the focus of my position is to suggest universal acceptance of analytical methods other than pitch class, the notion that pitch class and other models cannot coincide with each other is fallacious. In Op. 16, No. 2, the pitch class of each note of a contour traces to the next note of the same label, by the influence of Subcontouric Cells; every two notes with the same label contain an intertwined calculation. In other words, there is a connection between each sequential note in each contour– a hidden occurrence.

*Reference to Figure 15.

My forthcoming introduction of the Subcontouric-Cell concept is reinforced by providing representations of how contouric-celled structures are used in the second movement of Op. 16. Upon my examination of this piece, I will highlight Subcontouric
Cells by demonstrating how celled structure features what I introduce as a Contour Canon. A Contour Canon* is a canonic system controlled by Subcontouric Cells. Subcontouric Cells advance by cycling through rotations, until the entire contour aggregate is presented in P. Cells rotate against their paired cell much like how a lock undergoes combination permutations until the tumblers align, and has been unlocked.

*Reference to Figure 19.

Additionally, I will focus on how contour can influence the form* of a score. With reference to the Contouric Form of Op. 16, No. 2, the second and third section can be recognized as palindromic, and the overall architecture of the Contouric Form can be recognized as perpetual, for the ending of the score connects to the beginning of the score, forming an indefinitely concluding cycle. In addition to the models I validate within my contributions, I substantiate my claims by considering, by recognizing, and by incorporating models that have been previously developed.
*Reference to Figure 21B.
Chapter 1: Contour Conceptualization

Musicians and non-musicians alike typically recall familiar musical moments by recognizing melody as the main contributor for musical memory; however, melody is a compilation of two parameters—contour and intervallic relations—and, therefore, intervallic relations should not be recognized as the superior contributor of musical memory. W. Jay Dowling claims evidence that “memory for contour can function separately from memory for exact interval sizes,” and that even though contour is an abstraction from a melody, contour can be independently remembered. Naturally, contour anchors a melody, albeit contour should not be recognized as subordinate. The recognition should be focused on the function of each.

Contour conceptualization has yielded a wide variety of definitions, which are based on different interpretations and functions. Contour has been recognized for its adjacent-tone relationships (the directional relationship [ascending or descending] between one note and its adjacent note)—linearity, as well as recognized for a compilation of both adjacent-tone relationships and nonadjacent-tone relationships (the directional relationship between one note and any of its non-adjacent notes)—combinatoriality. Over time, psychologists, such as Dowling\textsuperscript{2}, and music theorists, such as Marvin, Laprade,\textsuperscript{4} Friedmann\textsuperscript{5}, Polansky, and Bassein\textsuperscript{6}, have established understandings of contour perception, which are based on linear, and combinatorial

concepts. Each contributor has generated his or her own understanding for analytical purposes, such as Contour Class (CC), sgn, Contour Adjacency Series (CAS), Contour Adjacency Series Vector (CASV), Contour Interval Succession (CIS), Contour Interval (CI), Contour Interval Array (CIA), CSEG, and COM-matrix. Many of these definitions do share concepts, especially with regard to linearity, which is found in nearly every concept of contour.

*Combinatorial Relation Formula*

Every contour follows a specific formula that allows contour familiarity to remain under changes in pitch. I recognize contour with reference to the combinatorial concept by utilizing the Combinatorial Relation Formula (CRF). The CRF is a graphic representation of a contour, which indicates both the adjacent and nonadjacent directional relationships of a contour’s sequenced notes. Figure 1 shows the conversion of a contour into its appropriate CRF. Between each adjacent note, directional relation is indicated with either a + or with a −.

The listener’s sense of contour familiarity could focus not only around the adjacent relationship, but also around the non-adjacent relationship, combinatoriality. With regard to the CRF, beginning with the third note of a contour, an arrow is positioned below each note, indicating the directional relation between that note and two notes prior. If the arrow is directed downward, the associated note is lower than two notes prior. If the arrow is directed upward, the associated note is higher than two notes prior (see Figure 1). The only exception to recognizing the directional relationship between one note and two notes prior is if the note returns to the same tone. At that point, the directional

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7 See Chapter 4 for thorough descriptions of each indicated concepts of contour.
relationship is neutral and should be labeled with an equal sign. This property of contour allows familiarity to remain present under a change in intervallic relationship.

Figure 1. Contour converted to CRF:

Arbitrary tones deteriorate neither the familiarity nor the integrity of the contour, as long as the CRF is not compromised. Theorists, such as Dowling, have declared that a contour doesn’t need to claim responsibility for tone retention; however, it needs to claim responsibility for directional retention. As long as a theme is moving in a particular direction, despite the tone choices, the theme remains unaltered. Dowling believes melodies strongly depend on intervallic relations; therefore, a listener will maintain a sense of familiarity upon hearing a transposition of the original. Contrary to, or perhaps in addition to, Dowling’s belief, a listener’s perception of a melody presented at arbitrary pitch levels is not memorable due to melodic interest, but rather because each theme

8 Dowling, “Scale and Contour,” 270.

contains the same contouric structure. Under the notion that listeners’ perceptions of a contour under arbitrary tone collections exists unaltered, the framework of a contour can be realized in the CRF.

With effort to avoid digression, and for reader-convenience, I dedicated a section (Chapter 4) of my discussion to address supplemental concepts of contour, such as CC, sgn, CAS, CASV, CIS, CI, CIA, CSEG, and COM-matrix, and to map relations and differences between these models and my CRF.
Chapter 2: Subcontouric Cells

A contour can be divided into contour subparts, or Subcontouric Cells. The term “Cell” was chosen for description, for a cell is typically a building block for a larger organism or structure, as well as typically an object that works individually and together with other cells. These cells are, for the most part, conjoined or adjacent to each other. In Figure 2, the contour used in Figure 1 has been sectioned into two Subcontouric Cells. Each cell is to be treated as its own entity; therefore, a cell can undergo alterations without influencing the alteration of the conjoined cells from that contour. There are three positional alterations a cell can undergo: i) Counter Polarization, ii) reversed placement, and iii) rotation. Under alteration, the contour is in an unstable state, for the alterations distort the aural familiarity. Alteration constructs a new contour; however, despite alteration, the contour retains association to the Prime Form contour.

Figure 2. Contour divided into Subcontouric Cells:
Polarization and Counter Polarization

Once a contour is divided into several Subcontouric Cells, each cell is conjoined by what I will call a “polarized relationship,” which is the directional relationship between the last note in a cell and the first note in the following cell. This connection point of the two cells is labeled the axis. An unaltered polarized relationship is referred to as the cell’s Polarization (see Figure 3A). When the directional relationship of the Polarization is inverted, the two cells are bonded with a Counter Polarization (see Figure 3B). Once a contour is effected by a Counter Polarization, the non-adjacent relationship in the CRF is compromised; however, the newly constructed contour is associated with the Prime Form contour.

Figure 3.

3A. Polarization of a contour: 3B Counter Polarization of a Contour:
Reversed Placement

A pair of Subcontouric Cells can undergo reversed placement, so Cell 2 precedes Cell 1 (see Figure 4). The polarized relationship retains the same directional movement as the originally indicated Polarization; therefore, under reversed placement, the second note of Cell 2 will descend to the first note of Cell 1. On the contrary, two cells in reversed placement can inorganically undergo Counter Polarization (see “Determining the Polarized Relationship of Altered Aggregates,” on page 11).

Figure 4. Reversed placement of a contour:

Rotation

Any contour can cycle through rotations—Prime Form, Retrograde, Inversion, and Retrograde-Inversion (see Figure 5A). This alteration is the most occurring alteration in Webern’s Op. 16, No. 2. Many of the structures found throughout Webern’s works tend to use altered and mirrored designs. For the most part, his music seems to focus more on
the fact that everything revolves around one design, such as a specific set, row, or contour. The designs can be viewed straight on, as a reflection, or even inverted. In many instances, a design in its unaltered form is not presented until after variations have been presented and, yet, nonetheless, the unaltered design is engaged and active.

The prime form (P) of a contour is the order from the beginning to the end of the shape without any variation. The retrograde (R) of a contour is the reverse order of the prime form. The inversion (I) of a contour is the opposite operation (adjacent and nonadjacent relations) of the prime form. The Retrograde-Inversion (RI) is the reverse order of the inversion. These alterations have been recognized by several theorists, including Robert Morris, who believe that a set of contours can be equivalent. He recognizes this concept as CSEGs, which can be equivalent by identity—R, I, and RI—or, as Morris refers to them, transformations\(^{10}\).

Each Subcontouric Cell of a contour can individually cycle through P, R, I, and RI rotations without influencing the conjoined cell. While each cell can be altered from P to R, to I, or to RI (see Figure 5B), both cells can either cycle through the same rotation as each other, or through an alternate rotation as each other. Whether or not each cell cycles the identical rotations as the accompanied conjoined cell, the rotation of Cell 2 is not influenced by the rotation of Cell 1. In many cases, only one of the paired cells is altered, while the other cell remains in P.

Figure 5.

5A. Representation of all possible rotational alterations of a contour*:

*The horizontal arrows below the contour indicate the direction of which the contour must be read, in order to recognize the rotational alteration. When performing the contours, each one is read left to right.

5B. Representation of all possible rotational alterations of a Subcontouric cell*:

*Subcontouric Cells Labeling System*

When a score utilizes Subcontouric Cells, typically more than one contour is celled; therefore, each cell in each contour needs to be assigned a label in order to differentiate between cells, as well as to recognize which cell maps to its corresponding contour. I generated a two-digit labeling system, which categorizes each cell by mapping a cell to a specific contour (the first digit), and by indicating the order of the cell in the contour (the second digit). When a score contains two contours, and when each contour
can be divided into two cells, the first contour’s (Contour 1) cells are assigned the labels (1-1) and (1-2). The second contour’s (Contour 2) cells are assigned the labels (2-1) and (2-2) (see Figure 6). When a score contains additional contours, the first digit changes accordingly—(3-1)(3-2), (4-1)(4-2), and so forth.

Figure 6. Subcontouric Cells Labeling System:

Since cells are typically conjoined, (1-1) and (1-2) will remain a pair, and will rarely be found attached to another contour’s cell. When a cell undergoes rotation, they are labeled with “R”, “I”, or “RI” before the two-digit label, such as R(1-1), I(1-1), or RI(1-1). When a cell is in Prime Form, a “P” does not precede the cell; it is labeled with only the two-digit label, such as (1-1).

When referencing an aggregate’s Counter Polarization, or when a Polarized aggregate is being compared to a Counter-Polarized aggregate, a polarized-relationship labeling is utilized. If two cells are bonded with an ascending polarized relationship, a
“+” is placed between the two cells, such as (1-1)+(1-1); if two cells are bonded with a descending polarized relationship, a “–” is placed between the two cells, such as (1-1)–(1-2). The aggregate labeled “(1-1)(1-2)” is inferred to have an unaltered Polarization.

Determining the Polarized Relationship of Altered Aggregates

When cells are reversed, so that (1-2) precedes (1-1), the axis’ polarized relationship is established with either the same polarized relationship or with a new polarized relationship, such as in the I(1-2)R(1-1) aggregate. If (1-2)(1-1) has a “–” polarized relationship, and I(1-2)R(1-1) has a “+” polarized relationship (see Figure 7), it would seem that I(1-2)R(1-1) is conjoined with a Counter Polarization; however, that is, in fact, the opposite. Since each cell was rotated and the position of each cell was reversed from the originally unaltered (1-1)(1-2), the polarized relationship (+) in I(1-2)R(1-1), despite the differences from the original contour, is not the Counter Polarization. In order to obtain a Counter Polarization, one of the two cells in I(1-2)R(1-1) must be transposed, so that the directional relationship between each note, such as in the CRF, in Friedmann’s CC\textsuperscript{11}, in Polansky’s sgn\textsuperscript{12}, or any other combinatorial systems, is compromised. To determine if the contour’s axis has a Polarization or Contour Polarization, undo both the rotation and the reversed placement alterations, so that I(1-2)

\textsuperscript{11} CC measures both the adjacent and nonadjacent relationship of a contour. The model uses numbers to indicate the vertical position of the note the contour. The lowest pitch in a contour is labeled 0, while the highest number labeled is the highest pitch. For example, in CC <1-2-0-5-3-6-4>, the third note is the lowest pitch, the first note is the second lowest pitch, and the sixth note is the highest pitch. Refer to page 40 for an example of CC application.

\textsuperscript{12} sgn measures both the adjacent and nonadjacent relationship of a contour. In the sgn model, each note of the contour is given an alphabetical label: the first note is “a,” the second note is “b,” the third note is “c,” and so forth. The directional relationship between any two notes, such as of a and b, or of a and c, is indicated with a number. If the first designated note ascends to the second designated note, a “–1” is indicated, if the first designated note descends to the second designated note, a “1” is indicated, and if both indicated notes are in unison an “=” is indicated. Refer to pages 45 and 46 for an example of sgn application.
becomes (1-2), and so that R(1-1) becomes (1-1), as well as so that (1-1) precedes (1-2).

If the polarized relationship has been returned to its original state, the polarized relationship in I(1-2)R(1-1) is not a Counter Polarization. If, when undoing the alterations, the axis in (1-1)(1-2) has a Counter Polarization, then the axis in I(1-2)R(1-1) is a Counter Polarization.

Figure 7. The derivative* of I(1-2)+R(1-1):

*Aggregate (1-1) – (1-2) can be revered to (1-2) – (1-1), which each cell can, then, be rotated to R, forming an a R(1-2)+R(1-1) aggregate, or rotated to I, forming an I(1-2)+I(1-1) aggregate. I(1-2)+R(1-1) is an aggregate formed as a combination of two rotational alterations with a positional alteration.

A contour can be disguised as another contour by two cells’ being separated by a Counter Polarization. As long as the directional relationship between one note and two notes prior (represented with arrows below the note in a CRF) are the same, the two contours are identical; therefore, (1-1)(1-2) is equivalent to (2-2) – I(2-1). Even though (1-2) and I(2-1) are not part of the same contour, they are rhythmically and directionally identical; therefore, (1-1)(1-2) and (2-2) – I(2-1) share the same CRF (see Figure 8).
When a cell contains only two notes, upon rotation, two cells may appear identical, such as in P and RI cells, and in R and I cells; therefore, two aggregates of the same contour, such as aggregate R(1-2)R(1-1) and aggregate I(1-2)R(1-1), have the same CRF. If two aggregates of the same contour share the same CRF, it may seem as if the identity of a specific cell, who’s cell can be classified with two labels, is open to debate. In fact, despite the identical CRF, the cell must be undergoing only one rotation—either R or I. The reasoning for the specific identity, despite the identical CRF, can be explained by tracing each sequential note of the contour (Contour-Numbered Note) with the next occurrence of the same labeled note. This concept will be explained in detail on page 22–27.

Many analysts may pose the question, “if two aggregates of different contours, such as (1-1)(1-2) and (2-2) – I(2-1) are identical—as seen in Figure 8—upon analysis, how can we determine the proper labeling” or, rather, “why should we differentiate between the two contours if they share an identical CRF?” Even though both contours have the same CRF, each aggregate should not be identically labeled, for both aggregates associate with different contours.
These aggregates are in a class\textsuperscript{13} of a contour–classes which give contours ownership of a celled aggregate. The Prime Form contour is the parent contour. A contour with two cells can undergo thirty-two permutations. Every contour’s CRF has ownership over all thirty-two possible permutations; therefore, a contour in Prime Form, where Prime Form is one permutation, has thirty-one other possible permutations, and each permutation, acts as the parent contour’s offspring, which directly belongs to that Prime Form contour.

Figure 9. The thirty-two permutations (classes) of a two-celled contour:

\begin{center}
\begin{tabular}{cccc}
P+P & R+R & I+I & RI+RI \\
P–P & R–R & I–I & RI–RI \\
P+R & R+I & I+R & RI+R \\
P–R & R–I & I–R & RI–R \\
P+I & R+RI & I+RI & RI+I \\
P–I & R–RI & I–RI & RI–I \\
P+RI & R+P & I+P & RI+P \\
P–RI & R–P & I–P & RI–P \\
\end{tabular}
\end{center}

Figure 9 demonstrates all thirty-two possible permutations–there are sixteen orders in which an aggregate can be placed; however, that number doubles when Polarization and Counter Polarization takes recognition. Even though each permutation alters the CRF, and, even though, each permuted contour is a newly constructed contour, each permutation is associated with the CRF of the parent contour, or of the Prime Form contour.

\textsuperscript{13} This concept of class should not be misconstrued with Friedmann’s CC or CASV analytical models, or with Morris’s CSEG class analytical model.
Previsously Established Concepts of Contour Segmentation

This concept is not the first concept that suggests a contour can be segmented. Robert D. Morris believes a contour can be reduced, or condensed, using the Contour Reduction Algorithm. His algorithm requires one to locate the most valuable and invaluable notes of a contour, and remove them from the contour. The process involves recognizing the maxima and minima. The maxima is the high points of the contour, as well as the first note and the last note of the contour; the minima is the low points of the contour. Removing pitches, also referred to as pruning, undergoes different stages. Each stage is considered a depth—The original contour is considered “depth 0.” Once all minimas have been removed from the original contour, the contour is at “depth 1.” The process repeats so that the contour is reduced to “depth 2.” Pruning continues until no more pitches can be removed. The finalized contour, in its reduced state, is referred to as a prime contour (see Figure 10). This gives the idea that not every note plays an equal role, and that, perhaps, some notes only color the intended contour.

The Contour Reduction Algorithm process closely resembles the process and purpose of a Schenkerian Analysis; both processes establish a hierarchal relationship between notes in a segment of music, and both involve securing the highest and lowest tones, while all passing tones and inner voices are viewed subordinate. Once this process is carried out, the fundamental structure of the score is outlined.

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14 Morris, “New Directions,” 212.
Apart from obvious reasons, the Contour Reduction Algorithm differs from Subcontouric Cells, for the Contour Reduction Algorithm focuses on locating notes of higher importance in a contour, and using the notes as a determining aspect for aural familiarity, while Subcontouric Cells can deteriorate the aural familiarity.

Another concept that suggests a contour can be segmented is suggested by Elizabeth Marvin and Paul A. Laprade, who state that Friedmann’s CC model can be severed into ordered sub-groupings called c-subsegment (csubseg). The csubseg model is more similar to Subcontouric Cells than the Contour Reduction Algorithm is similar to Subcontouric Cells. Marvin and Laprade established the model that allows contours to be severed into smaller groups. For example, the contour in Webern’s Op. 10, No. 1, measures 7–11, CC<5-0-2-3-1-4>, can be segmented into the following csubsegs:

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15 Chart was taken from Morris, “New Directions,” 216.
CC<5-0-2-3>, which is equivalent to CC<3-0-1-2>, CC<0-2-3-1>, CC<5-3-1-4>, which is equivalent to CC<3-1-0-2>, and CC<5-3-1-4>, which is equivalent to CC<3-1-0-2> (see Figure 11A). This model can be realized in any contour, including contours from Webern’s Op. 16, No. 2. The contour in measure 8 of the second movement has a CC of <1-2-0-3>, which can be segmented into the following csebs: CC<1-2-0>, CC<0-2-3>, which is equivalent to CC<1-0-2>, and CC<1-2-3>, which is equivalent to CC<0-1-2>. (See Figure 11B). While csebs is used to realize all segments from a CC, including those that involve skipped tones, Subcontouric Cells separate contours into cells, which when placed together form an aggregate of the entire contour, without skipping over or removing tones to form a refined version.

Figure 11.

11A. * csebs of contour from measure 7–11, Op. 10, No. 1: 16

11B. csebs of contour from Measure 8, Op. 16, No. 2:

*Marvin and Laprade do not incorporate hyphens when indicating a CC.

16 Chart was taken from Marvin and Laprade, “Relating Musical Contours,” 229.
Chapter 3: Analysis of Webern’s Op. 16, No. 2

Despite peculiarity, Webern’s music may involve variation prior to the first occurrence of the Prime Form, such as beginning with a transposition of a row, with an inversion of a row, with a retrograde of a row, or with any other form of variation. Since the concept that variation can exist prior to an established Prime Form is rather unorthodox, analysts may have incorrectly analyzed much of Webern’s work, which wouldn’t be the first time Webern’s music has undergone incorrect analysis. In fact, many analysts have identified the $P_0$ row in a score based on the first published movement, rather than the first written movement— the publishing date does not reflect the order in which each movement was written. The movements in Op. 16, 20, 21, 22, 23, 27, 28, 29, and 31 where written in different orders than what is presented in publication. With regard to Op. 16, the second, third, and fourth movements were written in the summer of 1923, and the fifth and first movements were written in the summer of 1924, in that order.\textsuperscript{17} It is true that Webern had a “habit to begin a work with the untransposed prime row”\textsuperscript{18} and not a variation; therefore, the first movement written contains the true prime row, and because it contains the true prime row, when analysts began analyzing his work with the first published movement, rather than with the first written movement, they “identified the wrong row form as $P_0$.\textsuperscript{19}

As true as this notion may be, despite the tone rows, and despite the belief that it is impossible to begin work with altered forms, Webern may have begun some works with altered prime forms, such as in his contouric designs. Since the second movement


\textsuperscript{19} Bailey, “The Twelve-Tone Music,” 10.
was the first movement written, recognizing contours in any other movement as P would be invalid, unless each movement was recognized as its own structure, unattached to other movements.

Webern’s Op. 16, No. 2 uses four different contours, three of which—Contour One, Contour Two, and Contour Four—occupy Subcontouric Cells. Each of these contours occupies two cells (see Figure 12).

Figure 12. Contours and Subcontouric Cells utilized in Op. 16, No. 2:

Contour One isn’t presented in whole until measure eight. The piece begins with a variation of Contour One. The contour is divided into two paired Subcontouric Cells: RI(1-1) and (1-2). These cells cycle through variations before presenting the contour in its whole. The graph in Figure 13 is a complete contour analysis of Op. 16, No. 2, by showing the position of each Subcontouric Cell.
It is seen that each cell remains adhered to its partner cell; no cell is attached to another contour’s cell. Each aggregate is adhered using rotational alteration, reversed placement, Counter Polarization, a combination of the three variations, or no alterations. The piece begins with the clarinet’s playing a RI(1-1)(1-2), which uses only rotational alteration and not reversed placement, for each cell is adhered in the original sequential order—(1-1) preceding (1-2), and in addition, (1-1) is presented in an RI alteration.

Canonically, the same contour is presented in the upper voice of measure 2, following the same alterations as in measure 1—rotational alteration and not positional alteration; however, (1-1) is in R and (1-2) is in I. Simultaneous to the voice in measure 2, the

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20 Individual analyses for each contour can be found in Appendix A.
clarinet introduces Contour Two, by presenting the contour in a RI alteration. This alteration closely resembles the Prime Form of Contour Two (as seen in measure 5), for each contour’s cells are conjoined with identical alterations, forming a united aggregate—measure 2: RI(2-1)RI(2-2); measure 5: (2-1)(2-2).

In measure 4, aggregate RI(1-2)I(1-1) has undergone both rotational alteration and reversed placement. The cells are separated with a (−) Polarization. In order to determine if this polarized relationship is considered a Polarization or a Contour Polarization, undo the alterations of the cell, so that RI(1-2) becomes (1-2), so that I(1-1) becomes (1-1), and so that (1-1) precedes (1-2). The polarized relationship of the restored aggregate—(1-1)(1-2)—is “−”; therefore, indicating RI(1-2)I(1-1) is separated by a Polarization and not a Contour Polarization. Alternatively, in measure 10, aggregate RI(1-1)I(1-2), which has undergone only rotational variation to both cells, and not reversed placement, is separated by a Contour Polarization. The polarized relationship of the restored aggregate—(1-1)(1-2)—is “+”, which is the Contour Polarization. In effort to avoid my sounding redundant, I will henceforth discontinue analytical explanations of each aggregate, and focus my analysis on other celled occurrences in the score, such as on invaded temporal space.

**Invaded Temporal Space**

Each contour occupies its own space in the score, a space that is not invaded by another contour, for the exception of Contour Three, the only contour that does not contain Subcontouric Cells. Contour Three invades the space of other contours by sharing tones—the tones in one contour belongs to two cells, such as in the lower voice of
measures 4 and 5, where R3 invades I(2-2) and (1-1), and as in the upper voice of measures 4 and 5 where RI3 invades (2-2) and I(1-1). These intrusions distort the visual perception of the contours, for two contours claim ownership of the same note, and the association is unclear.

*Determining Rotation of a Two-Toned Cell*

When a Subcontouric Cell contains only two tones, as they do in Op. 16, No. 2, classifying if the cell is in R, I, or RI can be confusing and difficult to determine. For example, in measure 4, the vocalist sings a RI(1-2); this cell can be easily mistaken for (1-2), as found in measure 8. There are two ways to determine the undergoing variation of the cell in Op. 16, No. 2: i) The pitch-class of each note of a cell traces to the next note of the same label. Every two notes with the same label contain an intertwined equation; in other words, there is a connection between each sequential note in each contour—a hidden musical occurrence, and ii) The variation each cell undergoes is part of a canonical cycle; in order to belong to the cyclic function, the cell must be properly identified.

*i) Tracing Contour-Numbered Notes*

The sum of two related Contour-Numbered Notes equate to fourteen. A Contour-Numbered Note label, assigns association of a note to a specific contour. I created this labeling system (see Figure 14) with the effort to draw connections between specific notes in a contour to other notes with the same label. Each contour is assigned a Contour Number; each sequential note in a contour is assigned a label that corresponds to its
Contour Number– Contour-Numbered Note. In Contour One (C1), the first dotted quarter note is labeled 1(C1), the following eighth note is labeled 2(C1), the following quarter note is labeled 3(C1), and the following quarter note is labeled 4(C1). The sequential notes from Contour Two coincide with the label (C2); the sequential notes in Contour Three coincide with (C3); the sequential notes in Contour Four coincide with (C4). By following this model, every note in the second movement of Op. 16 can be shown belonging to a specific contour.

Figure 14. Contour Numbered Note labeling system:

Canonically, each 1(C1) maps accordingly to the next 1(C1) in the contrasting voice, similar to the structure of a strict canon. The sum of two mapped pitch-class notes equates to fourteen, or with the transposition of the clarinet equates to twelve. For

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21 A strict canon follows canonic structure in the tradition sense, where a basic theme is introduced, and is then followed by a response of the same theme from another voice. Each time the theme is reintroduced in a new voice, the entrance follows the same temporal distance on which the last voice entered.
example, when tracing the notes of 1(C1) throughout the score, with the clarinet’s melodic line recognized in a C♮ transposition, a row of 68t477t4e386 is created (see Figure 15). The sum of the first two tones (6 and 8) is fourteen, while the sum of the following two tones (t and 4) is also fourteen, or in a mod12 system is 2. If the tones of the clarinet voice are analyzed in the B♭ transposition, the row is recognized as 488457849366. The sum of two mapped pitch-class tones in this row, such as mapping 4 to 8, 8 to 4, 5 to 7, and so forth, is twelve, or in a mod12 system is 0. This equation works not only for every combination of two consecutive pitches in 1(C1), but also for every combination in each Contour Number in the piece. This includes all sequential notes in (C1), (C2), (C3), and (C4). Figure 16 is a graphic representation of the tracing of every note of each Contour Number from Op. 16, No. 2—pitch-class 0 is equivalent to pitch-class 12; pitch-class 1 is equivalent to pitch-class 13, which is why in, 4(C1), 1(C2), 2(C3), and 4(C4) (see Appendix B for the charts that trace each tone of each of these contours), the groupings that have 1 and 1 as the pitch-class numbers should be understood as 13 and 1, which equates to fourteen, or 13 and 13, which equates to twenty-six, which in pitch-class space (mod12 operation) is two or fourteen. If when tracing two adjacent tones with the same label do not equate to fourteen, but does equate to fourteen when traced to the adjacent tone in that cell, it is possible that the cell is in a rotational variation—R, I, or RI.

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22 In pitch-class analysis, 0=C♮, 1=C♯/D♭, 2=D♮, 3=D♯/E♭, 4=E♮, 5=F♮, 6=F♯/G♭, 7=G♮, 8=G♯/A♭, 9=A♮, 10 or t=A♯/B♭, and 11 or e=B♮. Since pitch-class analysis is represented in a mod12 system, in order to perceive tones in the cyclic pitch-class space, rather than in pitch space, 12=C♮, 13=C# 14=D♭, and so forth. This system is being used to recognize intertwined numerical connections of specific Contour-Numbered Notes, in pitch-class integers.

23 Additional graphs for the tracing of each note for every Contour Number can be found in Appendix B.
It may seem as if cells are not necessary to create this string, and that the contour as a whole should be sufficient; however, it is because of the cells that these relationships can be identified. 1(C1), which is the first note of (1-1), is traced to the next occurrence of 1(C1). It may seem as if 1(C1) should be the first note in the cell; therefore, it would seem that the first note of a cell always traces to the next occurrence of the first note of that same cell. If this was true, a contour as a whole is sufficient to create this string. The issue with this notion is if a cell is in R, then 1(C1) is the second note in the cell, and not the first note in the cell. If the first 1(C1) in a (1-1) is traced to the first note in R(1-1), an improper tracing has been made, for the R(1-1) is in retrograde, which indicates 1(C1) is the second note, and not the first note. In fact, the first two notes mapped in the 1(C1) string belong to two cells in R (See Figure 15); therefore, the first two 1(C1)s mapped are the second notes of the cell, in lieu of the first notes of the cell. This fact proves that this connection exists only under celled structure.
Figure 15. Tracing map of I(C1):

I(C1)

Figure 16. Tracings of each note in every Contour Number in Op. 16, No. 2:
The significance as to why every two consecutive Contour-Numbered Notes equates to fourteen is presently unknown. Perhaps this occurrence is inevitable, for the relation is a side effect or, rather, follows physics of another musical interaction. Nonetheless, this numerical relationship between consecutive Contour-Numbered Notes is still present, and this connection proves that Subcontouric Cells are required to make these relations.

The variation each cell undergoes is part of a canonical cycle. In addition to the parameter that was previously explained, the reasoning why RI(1-2) in measure four, must be RI(1-2) and not Prime Form (1-2) can be explained by recognizing the cell’s function in the canon.

**ii) Canonic Interaction**

During 1917–1925, Webern explored a new compositional plateau; he began to incorporate new principals, such as specific contrapuntal techniques, including canonicity, in his compositional practice. During these later years, his “compositions had to obey certain contrapuntal laws (e.g., strict canon in all possible variations).”  

While Webern followed certain contrapuntal laws, he had a tendency to incorporate layered canonic features, so that several musical features, such as melody, rhythm, and contour, are individually working in a canonic fashion.

**Contour Canon**

I propose there is an additional style of canon, which should be rightfully referred to as a Contour Canon. A Contour Canon can be recognized in the traditional sense,

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similar to a strict canon or to a canon by inversion, where an original theme or design is presented, and is then followed by a response of the same theme, as well as in an untraditional fashion, where his Subcontouric Cells are positioned in such a way that they assemble a canon. In this untraditional fashion, a contour’s cells are presented and altered in a rotational motion, until the entire image or contour can be seen in its Prime form.

Webern incorporates both styles of a Contour Canon in his second movement.

Each cell in a pairing of Subcontouric Cells cycles through their rotational variations, until they have established themselves in their intended contour position, or Prime Form, such as (1-1)(1-2), referred to as a contour’s Cell Cycle (see Figure 17 and 18).

Figure 17. An example of a contour’s cycling through its rotational variations, until it establishes itself at Prime Form:

![Figure 17](image1)

Figure 18. The Cell Cycles of contour-cell aggregate (1-1)(1-2) in Op. 16, No. 2:

![Figure 18](image2)
In a Cell Cycle, cells rotate against their paired cell much like how a lock undergoes combination permutations until the tumblers align. In measure 1 of the score, the canonic interaction begins with an $RI(1-1)(1-2)$, which is succeeded in the following measures with $R(1-1)I(1-2)$, $(1-1)R(1-2)$, $I(1-1)RI(1-2)$, $(1-1)I(1-2)$, $I(1-1)(1-2)$, $I(1-1)I(1-2)$ permutations, until in measure 8, the tumblers have been aligned at their Prime Form – $(1-1)(1-2)$. While this locking mechanism is being decoded, there are other unlocking processes from other Contour Numbers’ being solved (see Figure 19): Contour Two is solved in measure 4; Contour Three is solved in measure 7; Contour Four is solved in measure 11.

Contour One is the only contour whose cells cycle through their variations individually; the paired cells in Contour Two, Contour Three, and Contour Four each cycle through each rotation together, as if the cells perform as a unified and equal aggregate, or as one image. Contour Two cycles with $RI(2-1)RI(2-2)$, $R(2-1)R(2-2)$, $I(2-1)I(2-2)$, $(2-1)(2-2)$ permutations. Contour Three, which does not occupy Subcontouric Cells, cycles with $R(3)$, $RI(3)$, $I(3)$, $(3)$ permutations. Contour Four cycles through $R(4-1)R(4-2)$, $RI(4-1)RI(4-2)$, $I(4-1)I(4-2)$, $(4-1)(4-2)$ permutations. In measures 12 and 13, Contour Three is reintroduced, first in an inverted figure, resolving at $P$. This resolving rotation of $I$ to $P$ occurs for Contour One in measures 7 and 8, for Contour Two in measures 4 and 5, for Contour Three in measures 6 and 7, and again in measures 12 and 13, and for Contour Four in measures 10 and 11.
Even though there is evidence of the contouric structures that I have highlighted throughout Chapter 2 found in Op. 16, it should not be out ruled that this design did not exist in any of Webern’s previous or up-and-coming compositions.

*Contouric Form*

With regard to form, I digress from combinatoriality and focus on the linear aspect of a contour. Contouric Form is apparent when mapping the adjacent contour relationships within the overall structure of the score; therefore, the linear contour relationships in Op. 16, No. 2 is as follows:

![Contouric Form Diagram](image-url)
Figure 20 shows the linearity of each voice as it appears in the original score. The relationships identified can be sectioned into four groups; each of which, with regard to form, can be recognized with its own identity—A’, A, B, and A’ (see Figures 21A and 21B).

Figure 21.

21A. The form of linear contour in Op. 16, No. 2:

21B. Webern’s Op. 16, No. 2 sectioned to represent form based on Contour:
Each section’s final measure simultaneously occurs with the following section’s opening measure. This occurrence can make one’s aurally familiarizing the form a rather difficult process, for there is no clear-cut conclusion and beginning of a section.

It is rather clear why the second and fourth section is labeled “A” and “A’”– both sections share an identical contouric structure, with the exception of the minor change in the lower voice of measure 12, and the minor change in the upper voice of measure 13, which this occurrence will be examined shortly. Regardless of their being nearly identical, there are differences, which conclude that the final section is an A’ section. While the final A’ section maintains a rather stable structure, the first section, labeled “A’,” appears to have an entirely different linear structure than that of the second and fourth sections. We can account for this labeling by recognizing each measure as its own contour. Every contour in the A section (measures 4–7) is recognized as P, while every measure in the A’ section (measures 1–4) follows the same linear structure as the A section; however, each measure has some form of rotational variation. A’ can be identified in two settings– R and RI. When A’ is read in R, measure 4 of A’ is the R of the upper voice of A of measure 5; the upper voice of measure 3 is the I of the upper voice of measure 6, while the lower voice of measure 3 is the R of the lower voice of measure 5. Figure 22 demonstrates the relation of these two sections.
Figure 22. The structure of A' and A (Measures 1–7) in Op. 16, No. 2:

If the A' section is interpreted in the RI setting, the upper voice of measure 4 is the I of the lower voice of measure 4, the upper voice of measure three is the R of the lower voice of measure 5, the lower voice of measure three is the I of the upper voice of measure 5, the lower voice in measure 2 is the retrograde of the upper voice of measure 6, the upper voice of measure 2 is the an altered RI of the lower voice of measure 6, and the lower voice of measure 1 is an altered P of measure 7.

It is required to note that these representations are calculated without the links that connect each measure. In order to realize the score as one contour, the linear relationship between one measure’s contour and its adjacent measure’s contour must be considered; therefore, the true continuous contour of Op. 16, No. 2 is as follows:
Perpetuality and Topology

The two altered contours can be accounted by viewing the entire score as perpetual; the lower voice of measure 12, and the upper voice of measure 13 are each missing one linear relationship, which is particularly due to the fact that Contour Three has three notes, while Contour One, Contour Two, and Contour Four each have four notes. The missing linear relationship can be found in measures 1 and 2; the first “+” in the lower voice of measure 1 belongs to the lower voice of measure 12, and the first “−” in the upper voice of measure 2 belongs to the upper voice of measure 13. When both the first two measures and the last two measures of the score connect, where the final A′ section is presented before measure 1, the score becomes perpetual (see Figure 24). Once the score is perpetual, the lower voice of measure 12 can be identified as a completed RI, and the upper voice of measure 13 can be identified as a completed P (see Figure 25), essentially making the final A′ section a more stable A′, than the stability of the first A′ section.
Figure 24. The first two linear relationships displaced between the beginning of the score and the end of the score, essentially making the overall structure of the score perpetual:

![Linear relationships diagram](image)

Figure 25. Overall structure of Op. 16, No. 2’s Contouric Form:

![Overall structure diagram](image)

In addition to the overall score’s being perpetual, the second and third sections are considered palindromic, as indicated in Figure 25. When each section is performed in either anterograde or retrograde, the same theme is present. Section B contains a more traditional palindrome, where both directions are aurally identical, while the first A section is palindromic in a more abstract fashion, and, therefore, both directions are not aurally identical. In the first A section’s retrograde, each measure is viewed individually; the upper voice of measure 7 is the RI of measure 4’s lower voice. The same relationship exists between the upper voice of measure 6 and the lower voice of measure 5, as well as the upper voice of measure 5 and the lower voice of measure 6 (see Figure 26).
Webern’s use of Contouric Form in this manner addresses canonicity, for the structure of the Contouric Form, as indicated in Figures 24 and 25, can be explained by embedding the structure onto a Möbius Strip25 (see Figure 27). The score is divided so that the first A’ section and A section are one side of the strip (side a), while the B section and final A’ section is on the opposing side of the strip (side b). The strip is connected so that the linear relationship in the first measure connects to the last measure (as seen in Figure 24).

25 A Möbius Strip is a model that divides a two-dimensional figure into two measurably even segments—Segment a and Segment b. Segment b is inverted 180°, and attached to the backside of Segment a. One end of the newly conjoined segments wraps around to connect to the other end of the newly conjoined segments to make an infinite cycle; however, when connecting the wrapped around segments, a 180° twist is applied so that one end of Segment a connects to one end of Segment b. This model suggests that by starting at one point of the strip, such as at the connection of Segment b and Segment a, and moving in one direction, such as on Segment a, after one cycle the point will be at the same position, however the point is on the reverse, Segment b. An additional cycle will bring both points back to segment a, uninverted.
Figure 27. The framework of a canon embedded onto a Möbius Strip:
Chapter 4: Validity of CRF in Relation to Supplemental Concepts of Contour

As indicated in Chapter 1, contour conceptualization is a rather new platform, that has propelled psychologists, such as Dowling\textsuperscript{26}, and theorists, such as Marvin, Laprade,\textsuperscript{27} Friedmann\textsuperscript{28}, Polansky, and Bassein\textsuperscript{29} to further investigate contouric content, for twentieth-century music “has been generalized beyond melody[,] and may play an important structural role in specific composition or repertoire.”\textsuperscript{30} In this process, theorists have yielded a wide variety of definitions, which are based on different interpretations and functions. Since melody has been previously recognized for eliciting musical memorization and familiarity, since contour “is one of the features that most engage a listener [, and since] a melody’s shape is often more memorable than its specific pitch or interval content,”\textsuperscript{31} most psychologists and theorists have given attention to aural recognition of a contour, and not necessarily on it’s influence on other musical features.

Within each interpretation of contour, each contributor focused on the importance of either linear properties or combinatorial properties. Polansky, Bassein, Dowling, and Friedmann believe that contour familiarity remains in the linear structure, and that they would most likely view the CRF as an over-produced representation of contour.

\textsuperscript{30} Morris, “New Directions,” 205.
Michael Friedmann introduced five methods for conceptualizing contour: i) Contour Adjacency Series, ii) Contour Adjacency Series Vector, iii) Contour Class, iv) Contour Interval, and v) Contour Interval Succession.\textsuperscript{32}

*Contour Adjacency Series (CAS)*

CAS uses + and – to resemble ascending and descending pitches (see Figure 28); however, adjacent repeated tones are not recognized as a movement in contour. CAS allows changes in pitches to occur, as long as the linear directional movement is not compromised. This model is similar to the work of Dowling and Polansky, since Dowling states a melodic contour can be recognized by the “ups and downs,”\textsuperscript{33} and Friedmann claims that the familiarity of contour remains in the linear structure.

Figure 28. Adjacent directional relation in contour: Anton Webern, Op. 16, No. 2, measure 8:

![Figure 28](image)

*Contour Adjacency Series Vector (CASV)*

Friedmann claims the importance of recognizing the number of times a pitch ascends or descends in a contour. A contour can be altered, yet it can maintain the same CASV. For example, CAS \(<+, +, –, +, +, –, +, +, –, +, +, +, \ldots>\) and CAS \(<+, +, –, +, +, –, +, +, \ldots>\) both share a

\textsuperscript{32} Friedmann, “Processes: Pitch, Pitch Class,” 23–37.
\textsuperscript{33} Dowling, “Scale and Contour,” 341.
vector of CASV <4, 2>. Both seven-note contours ascend four times, and descend two times, as can be seen in each digit of the vector. The CASV allows different contours, such as those altered by rotation or retrograde, to be relatable.\(^{34}\)

**Contour Class (CC)**

While Friedmann’s CAS\(^{35}\) focuses on the linearity of a contour, his CC focuses on the combinatoriality of a contour. CC measures both the adjacent and nonadjacent relationship. It measures not in pitch-class, but it measures the position of the pitch in relation to the other pitches. The lowest pitch in a contour is labeled 0, while the highest number labeled is the highest pitch. For example, in CC <1-2-0-5-3-6-4>, the third note is the lowest pitch, the first note is the second lowest pitch, and the sixth note is the highest pitch (see Figure 29).

Figure 29. Contour Conceptualization of Friedmann’s CC (CC <1-2-0-5-3-6-4>):


By using the CC system, we can recognize Friedmann’s Contour Interval (CI) and the Contour Interval Succession (CIS).\(^\text{36}\)

**Contour Interval (CI)**

The space between each note in a CC can be labeled with a + or −, followed by a number (n), which represents pitch position distance; therefore, to measure the distance between two pitch positions in a CC, a CI is labeled +n or −n. The first two notes of CC <1-2-0-5-3-6-4>, for example, have a CI of +1.

**Contour Interval Succession (CIS)**

CIS is a diagram that demonstrates the pitch position distance between each note; therefore, the CIS of CC <1-2-0-5-3-6-4> is <+1, −2, +5, −2, +3, −2>, which is similar to Friedmann’s CAS, for they both show directional relationship between each note; however, the difference is CIS is more specific, for it gives the directional relationship along with the distance of each pitch placement. Even though CC and CIS do not show specific intervals, they, too, are similar, for they indicate when a pitch should return to a previously played pitch; for example, in CC <1-2-4-2-3-0> and in a CIS of <+1, +2, −2, +1, −3>, the second and fourth note, should have an identical pitch.

**Differentiating between CRF and Friedmann’s CC and CIS**

CRF differs from CC and CIS, for CC and CIS can require pitches to return to previously presented pitches; however, both CRF and CC represent the combinatorial structure. The CRF states that, no matter what the pitch is, as long as it utilizes the same

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adjacent directional relationship and the nonadjacent directional relationship between one note and two notes prior, the contour remains unaltered. Figure 30B shows two different melodic structures, utilizing the same CRF that was used in Figure 30A.

Figure 30.

30A. CRF for Op. 16, No. 2, measure 8:

30B. Two different melodic structures following the same CRF:

*Contour Interval Array (CIA)*

Friedmann claimed the importance of recognizing the frequency of contour intervals within a contour, by establishing the CIA, which measures how often specific CI s occur within a CC, by measuring the frequency of each ascending interval type and of each descending interval type. Each interval type is given a label:
i) ascending intervals:
Interval of one – CI+1
Interval of two – CI+2
Interval of three – CI+3
and so forth.

ii) descending intervals:
Interval of one – CI–1
Interval of two – CI–2
Interval of three – CI–3
and so forth.

To measure the ascending CIs that occur in a CC, anterogradely measure how many times a note ascends by CI+1, CI+2, CI+3, etcetera (See Figure 31). For example, in CC<1-2-4-5-3-0>, the three CI+1 intervals happen between 1 and 2, between 2 and 3, and between 4 and 5; therefore, it can be determined that For example, in CC <1-2-4-5-3-0>, the contour ascends by an interval of one (CI+1) three times, by an interval of two (CI+2) two times, by an interval of three (CI+3) two times, by an interval of four (CI+4) one time, and by an interval of five (CI+5) zero times. In order to measure the descending CIs that occur in a CC, anterogradely measure how many times a note descends by CI–1, CI–2, CI–3, etcetera. For example, in CC<1-2-4-5-3-0>, the two CI–1 intervals happen between 1 and 0 and between 4 and 3; therefore, it can be determined that in said CC, the contour descends by an interval of one (CI–1) two times, by an interval of two (CI–2) two times, by an interval of three (CI–3) one time, by an interval of four (CI–4) one time, and by an interval of five (CI–5) one time. The CIA is organized as <CI+1, CI+2, CI+3, CI+4, CI+5 / CI–1, CI–2, CI–3, CI–4, CI–5>. The numbers on the left side of the slash enumerate all ascending intervals in each interval type, and the numbers on the right side of the slash enumerate all descending intervals in each interval type. Once the frequency
of each interval is determined, the frequency of each interval should be inputted into its corresponding location in the CIA; therefore, the CIA of CC <1-2-4-5-3-0> is read as <3, 3, 2, 1, 0 / 2, 1, 1, 1, 1> (see figure 31). The numbers on the left side of the slash enumerate all ascending intervals in each interval type, and the numbers on the right side of the slash enumerate all descending intervals in each interval type.

Figure 31. CIA of CC <1-2-4-5-3-0>:

If the number of elements in a CC is represented by n, n+1 are the possible ascending (+) contour interval types, and n–1 are the possible descending (–) contour interval types; therefore, if a contour has six elements, there are five possible ascending and descending interval types. To ensure the determined CIA is correct, the universal array of contour intervals should be <5, 4, 3, 2, 1>: the sum of all CI+1 and all CI–1
should equate to five; the sum of all CI+2 and all CI–2 should equate to four; the sum of all CI+3 and all CI–3 should equate to three, and so forth (see Figure 32).\textsuperscript{37}

Figure 32. The universal array of contour intervals:

![Universal Array of Contour Intervals](image)

\[ \text{sgn} \]

Larry Polansky established the sgn model to indicate the directional relationship between one note in a contour and all other notes in that contour.\textsuperscript{38} In his model, each sequential note is alphabetically labeled; therefore, “a” is the first note, “b” is the second note, “c” is the third note, and so forth. The directional relationship is indicated with a number (n); therefore, \( \text{sgn}(a,b)=n \). If the direction of the two indicated notes in the sgn model is an ascension (\( a<b \)), then that direction is indicated with “\(-1\)” (\( \text{sgn}(a,b)=-1 \)); if the direction of the two indicated notes in the sgn model is a descension (\( a>b \)), then that direction is indicated with “1” (\( \text{sgn}(a,b)=1 \)); if the two notes in the sgn model are in unison (\( a=b \)), then that direction is indicated with “0” (\( \text{sgn}(a,b)=0 \)).\textsuperscript{39} A sequence of sgn relationships is indicated in braces (\{\}) (see Figure 33).

\textsuperscript{37} Friedmann, “Discussion of Contour,” 231
\textsuperscript{38} Polansky and Bassein, 262.
\textsuperscript{39} If \( a<b \), then \( \text{sgn}(a,b)=-1 \); if \( a>b \), then \( \text{sgn}(a,b)=1 \); if \( a=b \), then \( \text{sgn}(a,b)=0 \).
Indisputably, a four-note sequence (a cardinality (C) of 4, or C=4) contains three adjacent relationships (C−1). C−1 recognizes only the linearity of a contour (sgn(a,b) sgn(b,c), sgn(c,d), etc.), and disregards any nonadjacent relationship in a contour (sgn(a,c), sgn(a,d) sgn(b,d), etc.). As seen in Figure 33, measure 8 of Op. 16, No. 2 has a linear relationship of −1 1 −1 {sgn(a,b), sgn(b,c), sgn(c,d)}; the combinatorial relationship between one note and two notes prior is represented as 1 −1 {sgn(a,c), sgn(b,d)}. Additionally, Figure 33 indicates other linear and combinatorial relationship sequences in the discussed contour.

Contour Familiarity by Intervallic Transposition and Directional Retention

Dowling uses Beethoven’s Piano Sonata Op. 14, No. 1, illustrating the use of a melodic contour under different intervallic settings, to suggest that aural familiarity remains intact under equivalent intervallic transpositions. As this claim certainly holds true in Op. 14, No. 1, this is not a consistent property in all contour designs. This
characteristic found in Beethoven’s Op. 14, No. 1, seems to be a compositionl choice for melodic familiarity, and not necessarily for contour familiarity.

The familiar tune of J.S. Bach’s “Minuet in G Major” demonstrates a change in intervallic relationship between each melodic phrase, yet retains the same contour. The first two tones of Contour 1 move in a descending major fifth interval when, in Contour 2, the first two tones move in a descending major third interval (see Figure 34). The familiarity is not lost, because the listener was not retaining melodic familiarity, but instead because the listener retained contour familiarity.

Figure 34. A contour analysis* of J.S. Bach’s “Minuet in G Major” using CRF, CAS, CASV, CC, CIS, and sgn:

Contour 1 and Contour 2 of Bach’s “Minuet in G Major” are identical by the CAS, sgn, and CRF. Even though all three models agree that the two contours are identical, they are identical for different reasons. According to the CAS model, both contours share the same linear relationship, while according to the sgn model and the CRF, both contours
share the same combinatorial relationship. The CASV suggests that the two contours are not necessarily identical, but are related by sharing the same <4,2> vector.

Antithetically, Friedmann’s CC and CIS each show that the contours are neither identical nor related. The only similar aspect between CC <4-0-1-2-3-4-0> and CC <3-1-2-3-4-5-0> is that the final tone in each segment is the lowest pitch, which is a rather obvious detection.

If these two contours should be viewed with different identities, how can we account for the familiar aspect of these two contours? It may be arguable that both segments are familiar under melodic identity, rather than under contour identity; however, as valid as that belief may be, both contours are not an unmarred transposition of each other; there are intervallic differences, which should be enough to dismantle that validity. Since each segment, as found in Figure 34, are not unmarred transpositions of each other, the familiarity cannot be based on melodic attributes, but perhaps on contour attributes. Even though the CC and CIS systems can be utilized to analyze a contour, in this instance, they are separating two phrases that are aurally familiar to each other, and giving them individual identities, which seems to be counterproductive. This may make it seem that the CC and CIS system should be discontinued; however, perhaps these systems are being misused, and it should be suggested that the systems are credible by using them to determine aspects of a contour other than aural familiarity. Which brings forth the question “How many notes are required to create a contour?”

Dowling claims linear movements can ascend (+), descend (−), or remain the same (=), while Friedmann, who analyzes contour by using the CAS, disregards repeated
tones as a linear movement;\textsuperscript{40} therefore, he would recognize the opening theme of
Beethoven’s *Fifth Symphony* as a two-note sequence (CAS $\langle \rightarrow \rangle$). However, I believe if
the repeated G$s$ were condensed to one tone, making the contour a descending motion of
two notes, the aural familiarity would no longer remain. The theme does, in fact, use two
tones, but the four-note sequence and the combinatorial relationship between those notes
is what causes the aural familiarity to remain (see Figure 35). Furthermore, the aural
familiarity should remain under rhythmic change, as long as the CRF is not
compromised.

Figure 35. CRF and CAS for the opening theme from Beethoven’s *Fifth Symphony*:

\begin{center}
\includegraphics[width=0.5\textwidth]{Figure35}
\end{center}

*CSEG*

When a set of contours is transformationally equivalent (equivalent by R, I, and
RI rotation) the contours belong to what he refers to as a CSEG class. His CSEG class
follows a similar structure to Forte numbers, for it follows a two-digit classification
sequence: the first number is the cardinality—total amount of pitches in a contour; the

\textsuperscript{40} Friedmann, “Discussion of Contour,” 226
second number is a classification that allows several contours to belong to the class. For example, <0 1 2> and <2 1 0> belong to CSEG class 3-1, and <0 2 1>, <1 0 2>, <1 2 0>, and <2 0 1> belong to CSEG class 3-2.\footnote{Morris, “New Directions,” 209.} The number of classes per cardinality \((n)\) is determined by following the operation \(n!\). By following this operation, it can be concluded that a contour with a cardinality of two has two possible CSEGS, a contour with a cardinality of three has six possible CSEGS, a contour with a cardinality of four has twenty-four possible CSEGS, and so forth.

**COM-matrix**

The equivalence of two or more contours can be measured by using Morris’s COM-matrix model. COM-matrix shows the directional relation of each note in each transformation.\footnote{Morris, “New Directions,” 208.} Contours in the same CSEG class each follow the same COM-matrix. A COM-matrix is “an array of contour intervals,”\footnote{Morris, “New Directions,” 206.} consisting of 0s, +s and –s. The diagonal 0s in a COM-matrix represent the notes within a contour; therefore, a contour with a cardinality of four would form a 4x4 array. The +s and –s to the right of each note indicates whether note ascends or descend. The +s and –s below each note represents the inverted directional relation of each note. As an example, I converted the melody in measure 8 of Op. 16, No. 2 to a COM-matrix (see figure 36).
Figure 36. Op. 16, No. 2, measure 8’s melody converted to a COM matrix:
Conclusion

Over recent years, the pitch-class system has been accepted as a primary method for serial and dodecaphonic analysis; however, the pitch-class system is certainly not a paragon of post-modern musical analysis. Despite popular application, pitch class analysis is not a sufficient system for understanding the full construction of post-modern musical architecture, and, therefore, if this method is regarded with such superiority that other analytical methods are neglected, a disservice is being done to the integrity of the framework.

Pitch-class analysis focuses on only pitches and intervallic content; it cannot be utilized for measuring musical features that exist under arbitrary tone collections, such as contour. The recent rise in attention given to contouric analysis has prompted theorists, such as myself, to further investigate the contouric interaction in a score. Based on this exploration, psychologists, such as Dowling, and music theorists, such as Marvin, Laprade, Friedmann, Polansky, and Bassein, have suggested models, set around adjacent and nonadjacent relationship properties, such as in linearity and combinatoriality. These contributors have afforded us with the Contour Class, sgn, Contour Adjacency Series, Contour Adjacency Series Vector, Contour Interval Succession, Contour Interval, Contour Interval Array, CSEG, and COM-matrix models to assist and guide contour conceptualization, and to generate contour understanding and contour clarity. These models are based on different perceptions, interpretations, and understandings of contouric concepts and functions, and have been realized for analytical purposes. Even though many of these definitions share concepts, making their understandings similar, they all provide an interpretive variation. I recognize contour by using the Combinatorial
Relation Formula (CRF), which measures both the adjacent relationships and the nonadjacent relationships. Once a solid foundation of contour clarity has been established, contouric interaction in a score can be considered for analysis.

It has been my intent to generate a comprehensive representation, and an understanding of contouric influential potentiality, as well as to generate an understanding of Webern’s contouric and canonic designs. I suggest contour should be universally accepted as an influential device for features and systems of music other than melody. In Webern’s Op. 16, No. 2, contour has been reviewed as a structure that can be divided into contour subparts, or Subcontouric Cells. Upon my examination of Webern’s Op. 16, No. 2, I assiduously highlighted the contouric interaction, such as form, and, with reference to Subcontouric Cells, by featuring canonic procedures. In summation of these interactions, I have emphasized the importance of contour analysis by featuring Contour Canons and Contouric Form. It is clear that contour analysis brings awareness to underlying features in a score, which would not have been previously recognized.
Appendix A

Contour One’s Cell Cycle in Op. 16, No. 2

Contour Two’s Cell Cycle in Op. 16, No. 2
Contour Three’s Cell Cycle in Op. 16, No. 2

Contour Four’s Cell Cycle in Op. 16, No. 2
Cell Cycle of all Contours in Op. 16, No. 2
Appendix B

1(C1)

II

2(C1)
II

Gesang

Klarinette

1(C2)

1195

0259

II

Gesang

Klarinette

2(C2)
II

Gesang

Klarinette

Ruhig (4 - 6.22)

Dornmi je-nu.

mas ter ri-det, quas hau dul - com

som - man ri-det, dor mi je - nu

4(C4)

1102
Bibliography


