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Analysis of Webern's *Variations for Piano* Op. 27, No. 1

Anton Webern's fascination with symmetrical structures in his music is well known. For music theorists since the 1950s, both Webern's atonal and 12-tone compositions have proven to be ripe with meticulously clean and compelling explanations, often involving canons, palindromes, and other symmetrical musical constructions. Like the rest of his output, Webern's *Variations for Piano* Op. 27, No. 1 shows a preoccupation with mirror images in music. As Tiina Koivisto writes:

> The wealth of relationships inherent in Webern's Variations for Piano, Op. 27, a composition that has fascinated musicians for decades, cannot fully be enjoyed without taking into account the interaction between the surface composition and the underlying structures, just as it cannot fully be appreciated with acknowledging the dialectic between its symmetrical structures and the sense of temporal accretion. By inspecting these dialectics, whether between the surface and deeper levels, or between symmetry and temporal accretion, one may learn more about his music than by inspecting any element alone. It is only through this interaction that in such concise idioms of composition as Webern's a piece may become an intensified moment with depth that penetrates all its structural layers. (Koivisto: 67)

The structural depth of the mirror symmetries that Koivisto speaks about is an ideal that I believe goes unachieved and is a distraction from the real structural entities at work. At the time of composing, Webern had already completed his monument to symmetry in his *Symphony* Op. 21 (1928). Kathryn Bailey writes that the *Symphony*, "was perhaps to remain the most eloquent expression of symmetries in all of his *oeuvre*…His handling of the hall of mirrors represented by this work was masterful…perfect reflections are continually thorn out of focus by a variety of means: canon; asymmetrical changes of tempo, scoring and texture; the use of grace notes; elisions. The balance between identity and variety in this work seems to me perfectly judged (Bailey: 246)."

After the completion of the Opus 21, mirror structures seem to either frustrate Webern or play only a surface feature in his music (Bailey: 299).[1]

In the case of Webern's Opus 27, a three-movement set of "variations," there are clearly symmetrical features that can be drawn across both the vertical and horizontal axis. This paper will demonstrate the mirror features of the first movement and comment upon why they are interesting, but ultimately unimportant to the deep structural elements guiding the piece. After navigating the maze of mirrors, I will speak to the form of the movement as indicated by rhythmic motives and conclude with a set theory dissection of the piece, focusing on the importance of sc(016).

Before approaching the mirror structures, the 12-tone row that Webern employs in the first movement of Opus 27 necessitates some discussion. Taken as an isolated piece of music instead of a movement inside a larger work, common sense would indicate that the line beginning in the first measure in the right hand would constitute the prime permutation of the row. This yields a row that will carry the theorist through the piece, yet results in very few elucidating connections. This, however, is not an isolated work, and is motivically connected to the remaining two movements. Using the first five measures from Opus 27, No. 3, one can construct a 12-tone matrix that has quite a bit to say about the present movement:

[1] Kathryn Bailey's discussion on Webern's frustration incorporating the Latin palindrome SATOR AREPO in his Op. 24 *Concerto for Nine Instruments* (1931–1934) is particularly enlightening. She points out that Webern's final work, the Op. 31 *Cantata* is devoid of any symmetrical properties and instead focuses on structural qualities other than symmetry.

| | $I_3$ | $I_{11}$ | $I_{10}$ | $I_2$ | $I_1$ | $I_0$ | $I_6$ | $I_4$ | $I_7$ | $I_5$ | $I_9$ | $I_8$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $P_3$ | 3 | E | T | 2 | 1 | 0 | 6 | 4 | 7 | 5 | 9 | 8 | $R_3$ |
| $P_7$ | 7 | 3 | 2 | 6 | 5 | 4 | T | 8 | E | 9 | 1 | 0 | $R_7$ |
| $P_8$ | 8 | 4 | 3 | 7 | 6 | 5 | E | 9 | 0 | T | 2 | 1 | $R_8$ |
| $P_4$ | 4 | 0 | E | 3 | 2 | 1 | 7 | 5 | 8 | 6 | T | 9 | $R_4$ |
| $P_5$ | 5 | 1 | 0 | 4 | 3 | 2 | 8 | 6 | 9 | 7 | E | T | $R_5$ |
| $P_6$ | 6 | 2 | 1 | 5 | 4 | 3 | 9 | 7 | T | 8 | 0 | E | $R_6$ |
| $P_0$ | 0 | 8 | 7 | E | T | 9 | 3 | 1 | 4 | 2 | 6 | 5 | $R_0$ |
| $P_2$ | 2 | T | 9 | 1 | 0 | E | 5 | 3 | 6 | 4 | 8 | 7 | $R_2$ |
| $P_{11}$ | E | 7 | 6 | T | 9 | 8 | 2 | 0 | 3 | 1 | 5 | 4 | $R_{11}$ |
| $P_1$ | 1 | 9 | 8 | 0 | E | T | 4 | 2 | 5 | 3 | 7 | 6 | $R_1$ |
| $P_9$ | 9 | 5 | 4 | 8 | 7 | 6 | 0 | T | 1 | E | 3 | 2 | $R_9$ |
| $P_{10}$ | T | 6 | 5 | 9 | 8 | 7 | 1 | E | 2 | 0 | 4 | 3 | $R_{10}$ |
| | $RI_3$ | $RI_{11}$ | $RI_{10}$ | $RI_2$ | $RI_1$ | $RI_0$ | $RI_6$ | $RI_4$ | $RI_7$ | $RI_5$ | $RI_9$ | $RI_8$ | |

Example 1: A 12-tone matrix based on the theme from Webern's Op. 27, No. 3.

At once the set of permutations generated from this 12-tone matrix fall into place on the first movement. Instead of using measure one's top voice as prime, the bottom voice can be more fruitfully represented as $P_{11}$.

The 12-tone row used as the theme throughout Webern's Opus 27 has some interesting properties that heavily influence deeper structures of the first movement. The interval classes created by adjacent members of the row are shown in Example 2a:

a. $P_{11}$   E 7 6 T 9 8 ¦ 2 0 3 1 5 4
ic:   4 1 4 1 1 6 2 3 2 4 1

b. $R_{11}$   4 5 1 3 0 2 ¦ 8 9 T 6 7 E
$P_{11}$   E 7 6 T 9 8 ¦ 2 0 3 1 5 4
ic:   5 2 5 5 3 6 ¦ 6 3 5 5 2 5

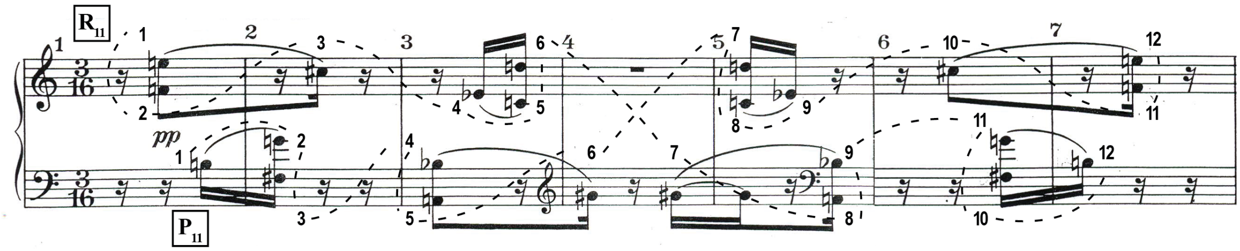
Example 2: Interval classes created by adjacent members of the row and retrograde-related rows.

Unlike several earlier works including the Opus 21 *Symphony*, Webern chose not to use an intervallically-symmetrical row. Instead, there seems to be a predominance of interval class 1 and 4. These two interval classes also begin and end the row in the prime ordering, allowing up to two degrees of overlap between adjacent rows of the same permutation. The row is also nicely split into two hexachords by the presence of the only tritone. The two hexachords created by this split in $P_{11}$ are [6789TE] and [012345], both members of sc(012345) and exhibiting the highest degree of hexachordal combinatoriality. The fact that $P_{11}$ is prime combinatorial with $P_5$ will play a role further into this analysis.

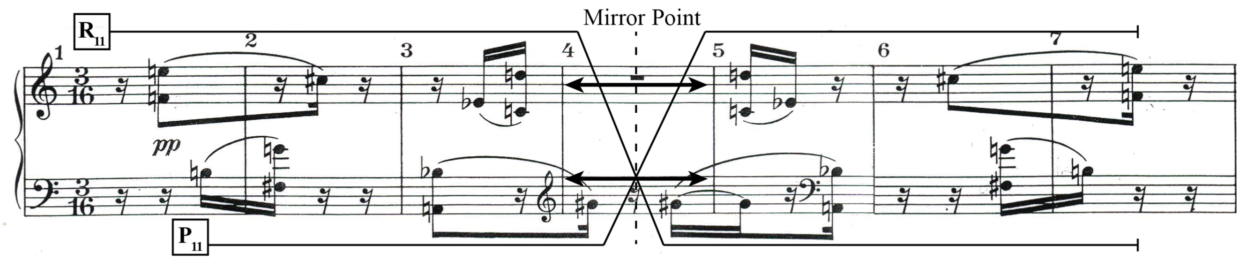
The first movement of Opus 27 is characterized by its exclusive use of simultaneous retrograde-related rows. Example 2b shows the resulting interval classes created by a combination of $P_{11}$ and $R_{11}$, the opening pair of rows in the first movement. By examining these simultaneities in first species counterpoint, we find a preponderance of interval class 5. This is not by itself a remarkable feature, but it too will play a role as the analysis progresses.

A simple 12-count of the entire first movement reveals Webern's consistent use of pairs of retrograde-related rows. For every occurrence of a prime, there is a retrograde at the same transposition level; likewise for inversions and retrograde-inversions. Moving beyond this basic observation, interesting shapes begin to emerge when one traces the distribution of the pairs of rows across the left and right hands:

a.




b.




Example 3: A 12-count of mm. 1–7 of Webern's Op. 27, No. 1 showing the rows changing voices across a mirror point.

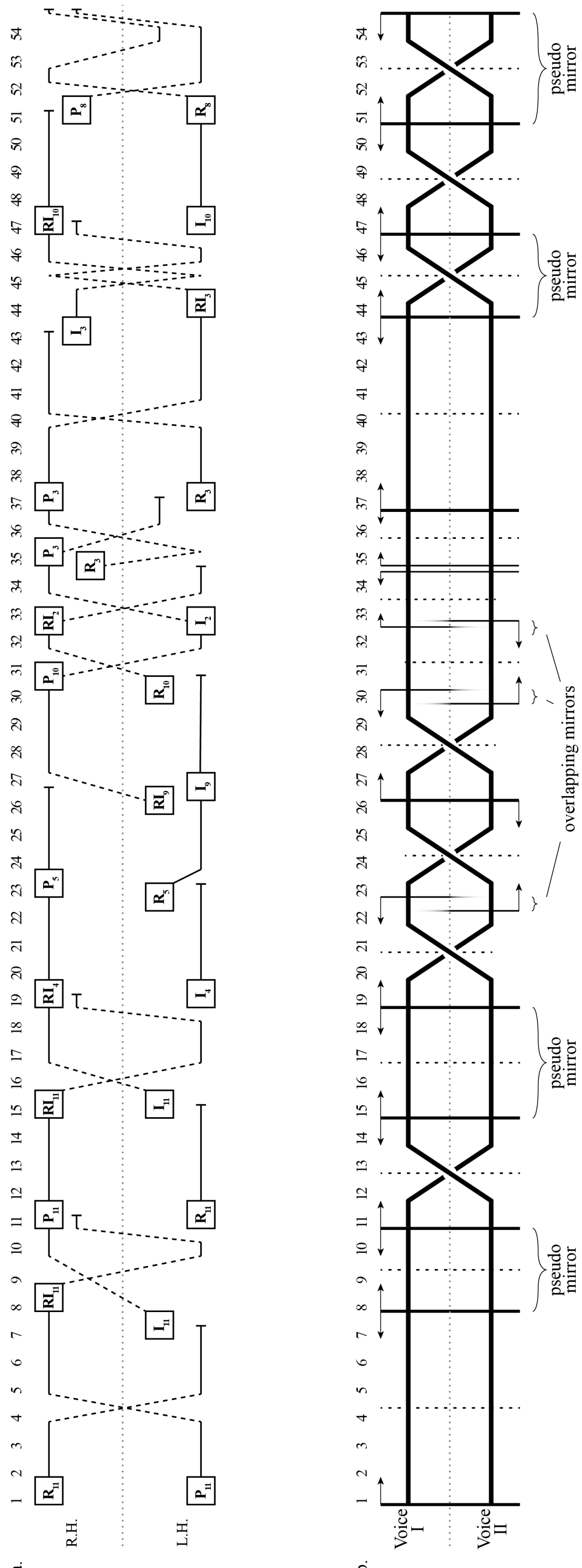
If it is possible to understand Webern's voice-leading intentions through his notational conventions, then it would be reasonable to assume that the right hand and left hand each constitute a voice. Example 3a shows the paths of both $R_{11}$ and $P_{11}$ traversing the top and bottom voices respectively and swapping voice positions in measure 4. The point where the rows jump from one voice to the other is a critical juncture at the rhythmic and pitch level in addition to being the hexachordal division of the rows. From measure 4, beat 3 onward, the previous music is played in reverse, forming a perfect palindrome with what came before.

Some observations need to be made about Webern's voice exchange and mirror techniques employed here. One of two types of movement can occur at or around the mirror points: 12-tone row voice exchange, or pitch-class voice exchange. Example 3b demonstrates the first kind of voice exchange involving the movement of the rows from one hand to the other. Pitch-class voice exchange does not occur because the pitch content in measures 1–4 remains in the same hands across measures 4–7. Conversely, measures 11–15 demonstrate pitch-class voice exchange:


Example 4: A 12-count of mm. 11–15 of Webern’s Op. 27, No. 1 showing the pitch-classes changing voices across a mirror point.

Due to the retrograde-related nature of the simultaneous pairs, this delineation is in fact two ways of describing the same phenomenon. Another feature of retrograde-related pairs is the creation of 12-tone aggregates on either side of the mirror point, providing an atonal sense of completion on one side that must be matched by its reflection.

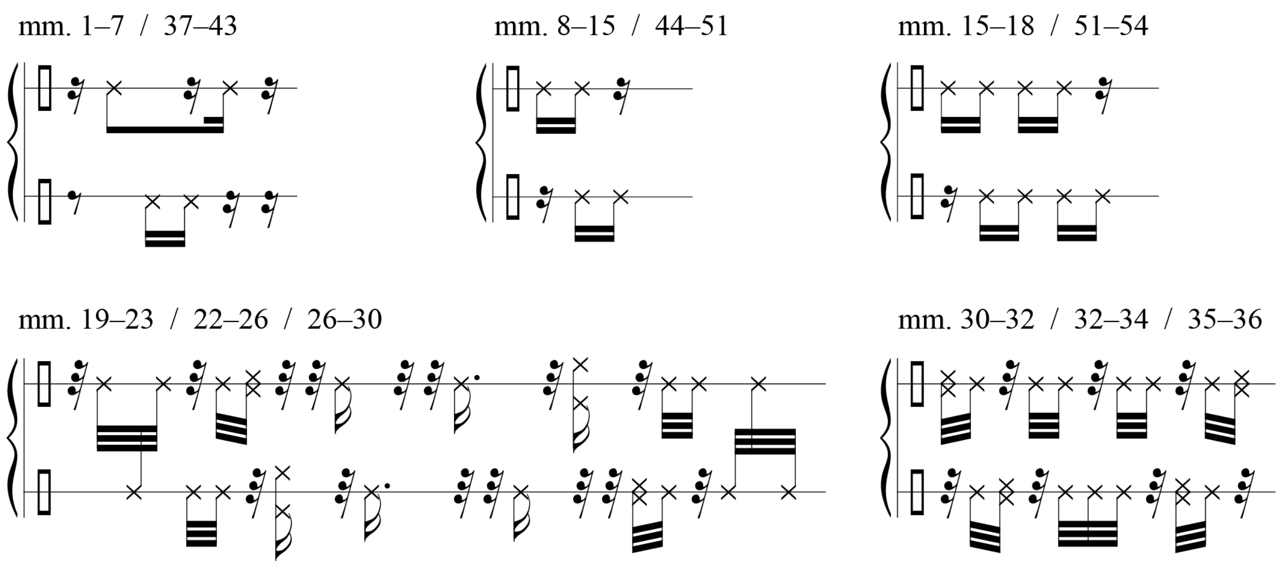
The perfect palindromic shape of measures 1–7 is a prototype upon which the entire piece is based. The slow tempo and clear two-voice counterpoint make this forwards-backwards music easy to hear. Sustained musical interest must be difficult to maintain in mirror perfection as Webern quickly begins to distort the mirror parameters after the first phrase. Example 5 shows the entire movement mapped by permutation, voice exchange, and mirror points:




Example 5: Showing a map of permutations, voice exchanges, and mirror points in Webern's Op. 27, No. 1 (see Appendix A for a larger version of this example).

The most notable feature of the large-scale mapping is the overlapping mirror structures shown in Example 5b. Beginning in measure 22, Webern employs an overlapping technique that obscures the mirror structures by placing a mirror start point prior to the previous mirror end point. This has the distinct effect of creating a denser sense of polyphony as well as being a vehicle of development for the crucial mirror paradigm. The beginning and ending of the movement have small sections labeled “pseudo mirror” that have palindromic characteristics but are imperfect in their reflections. These sections provide contrast to the perfect mirror structures that surround them.

Another reward of mapping the large-scale voice exchange and mirror points is the clear demonstration of form. Symmetries apparent in both the beginning and end indicate a ternary form. An alternate way to flesh this out is by examining repetitive rhythmic patterns:




Example 6: Rhythmic motives used in Webern’s Op. 27, No. 1.

In yet another example of working from limited means, Webern restricts rhythmic choices in the movement to a handful of small motivic patterns. This is particularly apparent in the peculiar notational practice of beaming notes across barlines as in measures 1–2. The ternary plan is articulated in the duplicate use of rhythms from measures 1–18 in measures 37–54. The two rhythmic patterns not belonging to the opening and closing sections constitute a large-scale middle section comprised of longer 24- and 11-unit patterns. The overall design of the three rhythmic gestures from measures 1–18 is one of increasing rhythmic overlap. By contrast, the design of the middle section's rhythms are occupied with canonic mirror patterns. A simple formal scheme can be drawn based on these observations:

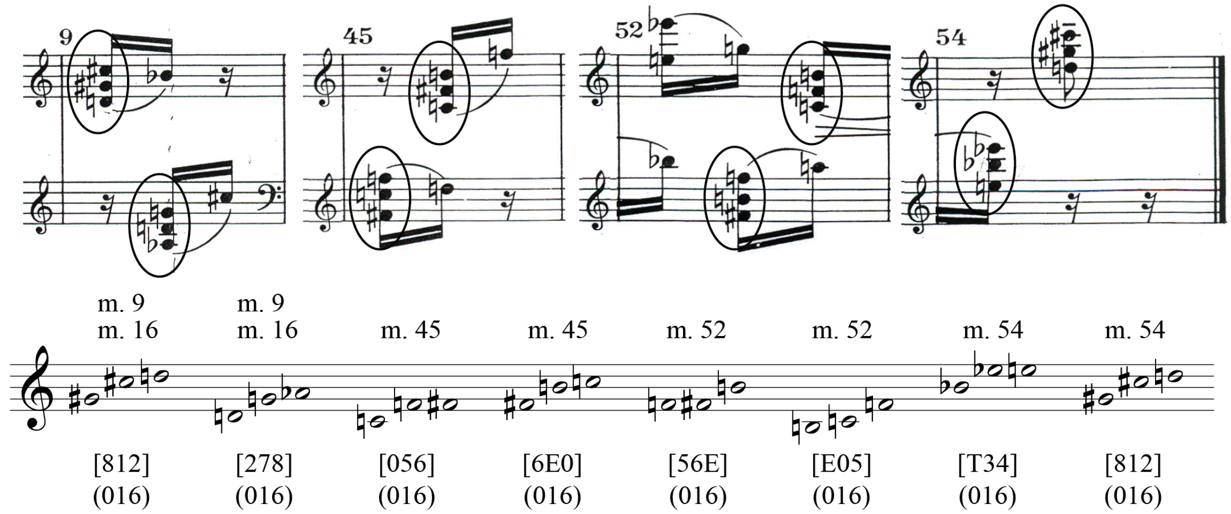
| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *rit.* | *tempo* | | | | | *rit.* | *tempo* | | *rit.* |
| | **A** | | | | | **B** | | | | **A$^1$** | |
| **a** | **b** | **c** | **d** | **d$^1$** | **d$^2$** | **e** | **e$^1$** | **e$^2$** | **a$^1$** | **b$^1$** | **c$^1$** |
| mm. 1–7 | 8–15 | 15–18 | 15–23 | 22–26 | 26–30 | 30–32 | 32–34 | 35–36 | 37–43 | 44–51 | 51–54 |

Example 7: The form of Webern's Op. 27, No. 1 based on rhythmic motives.

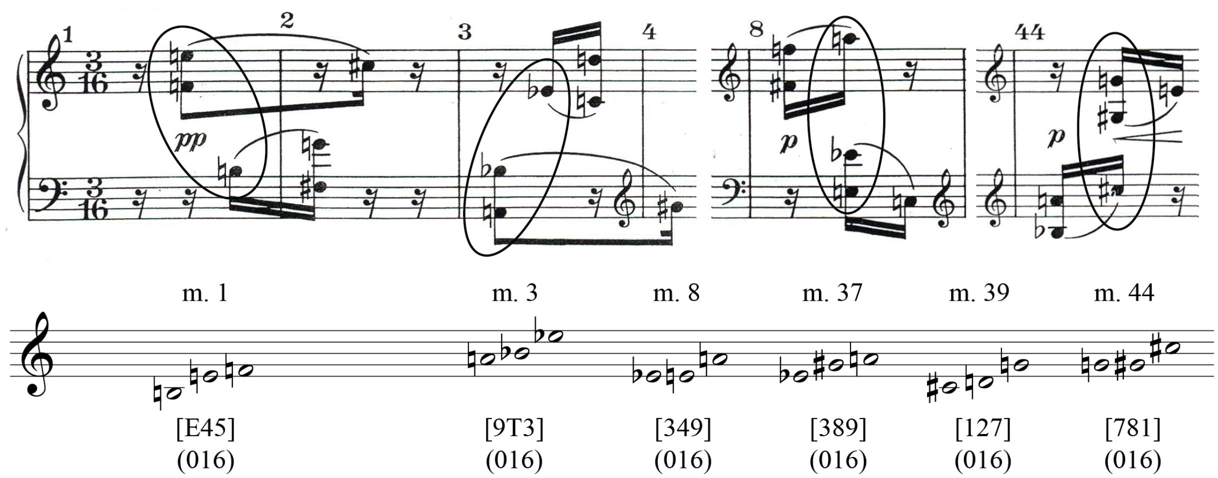
In addition to returning rhythmic motives, either repeated perfectly or with minor variation, tempo changes help indicate structural delineations. Both transitional areas from measures 15–18 and 35–36 have *ritardando* indications that precede an *a tempo* marking, making the ternary form audibly apparent. Finally, the return to the A section in measure 37 is readily perceptible, not because of pitch or mirror relationships, but because of familiar rhythmic gestures. While the rhythms have changed voices and have been slightly altered, the overlapping patterns clearly signal a return to the beginning.

Though he was by this point in his career a staunch 12-tone composer, Webern's earlier interest in free atonality seems to have a major impact on the Opus 27. In particular, sc(016) permeates both surface and structural features. The occurrence of sc(016) in simultaneously sounded trichords is a striking surface feature:

a.



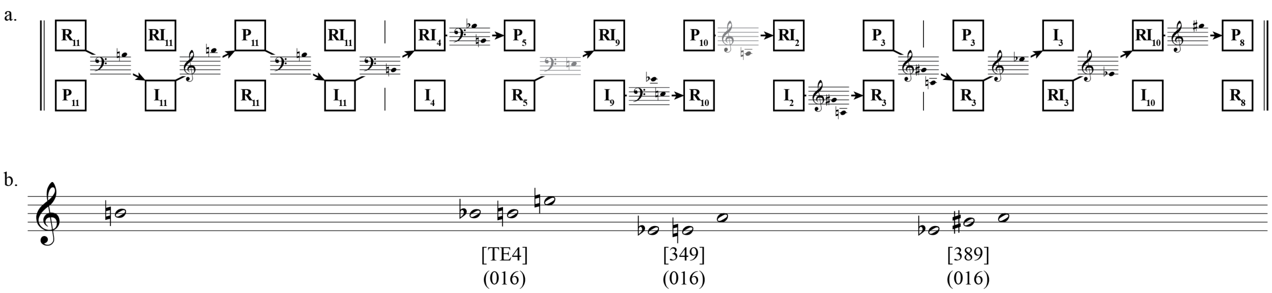

b.




Example 8: Segmentation of trichords belonging to sc(016) in Webern’s Op. 27, No. 1.

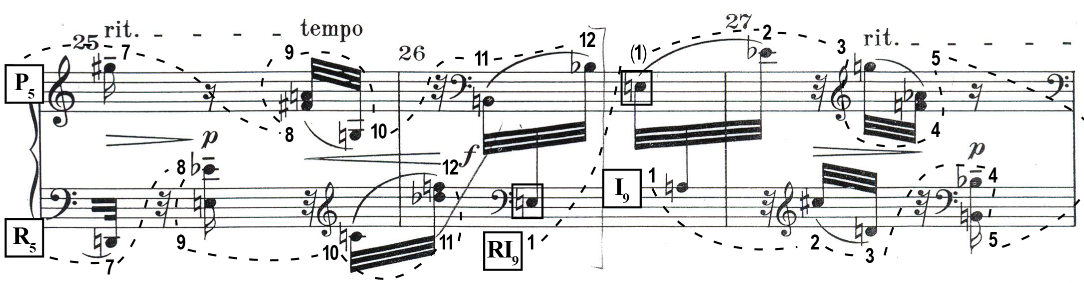
Besides the obvious trichords in Example 8a, the incidental overlaps of diads and single pitches resulting in sc(016) sonorities are too numerous to mention. Example 8b shows some of them.

Importantly, these trichords are easy to hear. However, the connection with sc(016) goes deeper than these surface features. Returning for a moment to the interconnectedness of the row discussed above, interval-class duplicates 1 and 4 allow for two degrees of adjacent row overlap (see Example 2). Webern makes deft use of this attribute by linking adjacent rows together through serial elision:




Example 9: Elision of pitches in adjacent rows in Webern's Op. 27, No. 1 (see Appendix A for a larger version of this example).

Example 9a is a reduction of the permutations displayed in Example 5a, showing the pitch or pitches that link one row to the next. The overall structural detail brought to light here is a sc(016) correspondence with groups of linking pitches shown in Example 9b. Some of the linking pitches are implied (shown in Example 8a as greyed out). Pitch-class 4 does not elide $R_5$ and $RI_9$, but instead implies it through repetition:




Example 10: A 12-count of mm. 25–27 in Webern's Op. 27, No. 1 showing repetition of pc4.

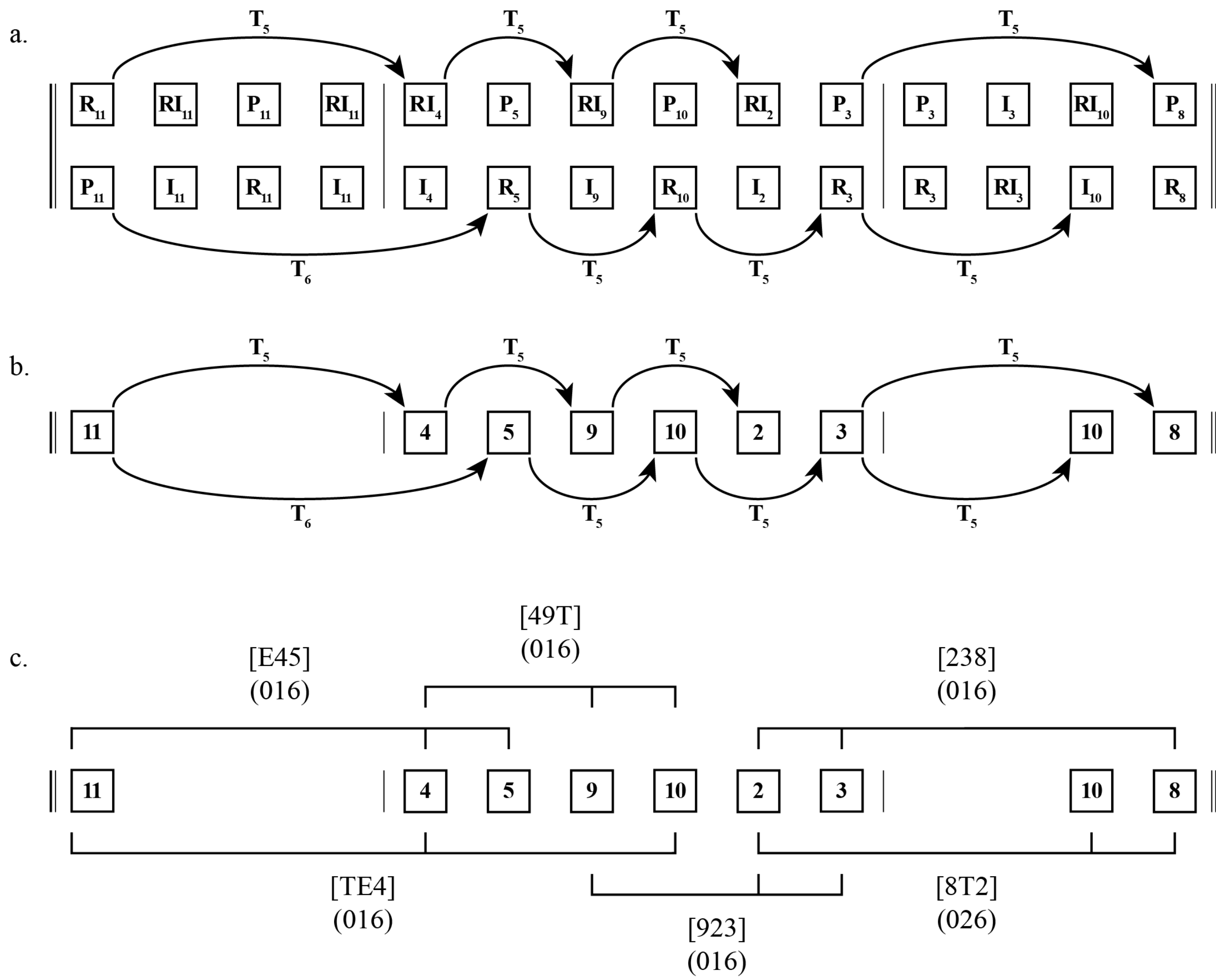
Repetition of a pitch-class in a serial row is not remarkable, unless it is the only occurrence of repetition in the entire movement. This is the case of pc4 in measure 26, and besides emphasis, the repetition provides a suitable implied linked between $R_5$ and $RI_9$.

Another implied elision between adjacent rows in Example 9 is pc9 in measure 32:


Example 11: A 12-count of mm. 30–32 in Webern's Op. 27, No. 1 showing an implied link on pc9.

Pitch-class 9 links together $P_{10}$ and $RI_2$ by evoking a thematic repetition of measure 30. Due to the overlapping mirror characteristics of the development section, the start point of a mirror may occur in two places in measure 30: either on the diad B♭5 / G♭5 in the right hand, or on the E♭4 in the left hand. The first choice gives a perfectly symmetrical reflection in measure 32, while the second choice imperfectly compresses the E♭4 and A♮3 together, approximating the original three-note gesture. In a sense, this provides a thematically implied elision between $P_{10}$ and $RI_2$. While the audibility of the linking pitches in Example 9 is questionable, their set-class link with surface features indicates their influence on a deeper structural level.

The importance of sc(016) goes even deeper when examining the transposition levels of serial permutations in the Opus 27, No. 1. Clearly the expository section (mm. 1–18) is concerned with transposition level 11. This is reflected in its use as a linking pitch-class in Example 9. Moving into the remainder of the piece yields a sequence of transposition levels that have a multi-dimensional array of connections with other subjects of this analysis:




Example 12: Transpositional relationships in Webern's Op. 27, No. 1.

Example 12a shows permutations that are related by transposition level 5. The number five was discussed earlier in terms of interval-classes resulting from combining pairs of retrograde-related rows. The predominant interval-class from that compositional decision was ic5 and can be found all over the surface of the movement. That the transpositional relationship between interlocking pairs of permutations is also ic5 seems like a conscious decision. The interlocking nature of these pairs of permutations is more clearly illustrated in the reduced diagram in Example 12b.

One oddity in the otherwise neatly interlocking permutation pairs is the relationship of $P_5$ to anything that precedes it. Marked in Example 12a/b as a transposition level of 6 away from $P_{11}$ seems almost meaningless. One very nice solution to this is to view all of the transposition levels as participating in the overarching sc(016) schema. In this way, the transposition levels of permutations $P_{11}$, $I_4$, and $P_5$ give way to pitch-class set [E45], member of sc(016). Example 12c shows similar connections drawn with the remaining permutations to create an interlocking web of transposition levels linked together by sc(016).

Another explanation of the $P_{11}$ / $P_5$ oddity is by hexachordal combinatoriality. Mentioned above, hexachord sc(012345) is all-combinatorial, meaning that it has a unique set of relationships with other rows in its matrix. One of those relationships is between $P_{11}$ and $P_5$:

| | $I_3$ | $I_{11}$ | $I_{10}$ | $I_2$ | $I_1$ | $I_0$ | $I_6$ | $I_4$ | $I_7$ | $I_5$ | $I_9$ | $I_8$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $P_3$ | 3 | E | T | 2 | 1 | 0 | 6 | 4 | 7 | 5 | 9 | 8 | $R_3$ |
| $P_7$ | 7 | 3 | 2 | 6 | 5 | 4 | T | 8 | E | 9 | 1 | 0 | $R_7$ |
| $P_8$ | 8 | 4 | 3 | 7 | 6 | 5 | E | 9 | 0 | T | 2 | 1 | $R_8$ |
| $P_4$ | 4 | 0 | E | 3 | 2 | 1 | 7 | 5 | 8 | 6 | T | 9 | $R_4$ |
| $P_5$ | 5 | 1 | 0 | 4 | 3 | 2 | 8 | 6 | 9 | 7 | E | T | $R_5$ |
| $P_6$ | 6 | 2 | 1 | 5 | 4 | 3 | 9 | 7 | T | 8 | 0 | E | $R_6$ |
| $P_0$ | 0 | 8 | 7 | E | T | 9 | 3 | 1 | 4 | 2 | 6 | 5 | $R_0$ |
| $P_2$ | 2 | T | 9 | 1 | 0 | E | 5 | 3 | 6 | 4 | 8 | 7 | $R_2$ |
| $P_{11}$ | E | 7 | 6 | T | 9 | 8 | 2 | 0 | 3 | 1 | 5 | 4 | $R_{11}$ |
| $P_1$ | 1 | 9 | 8 | 0 | E | T | 4 | 2 | 5 | 3 | 7 | 6 | $R_1$ |
| $P_9$ | 9 | 5 | 4 | 8 | 7 | 6 | 0 | T | 1 | E | 3 | 2 | $R_9$ |
| $P_{10}$ | T | 6 | 5 | 9 | 8 | 7 | 1 | E | 2 | 0 | 4 | 3 | $R_{10}$ |
| | $RI_3$ | $RI_{11}$ | $RI_{10}$ | $RI_2$ | $RI_1$ | $RI_0$ | $RI_6$ | $RI_4$ | $RI_7$ | $RI_5$ | $RI_9$ | $RI_8$ | |

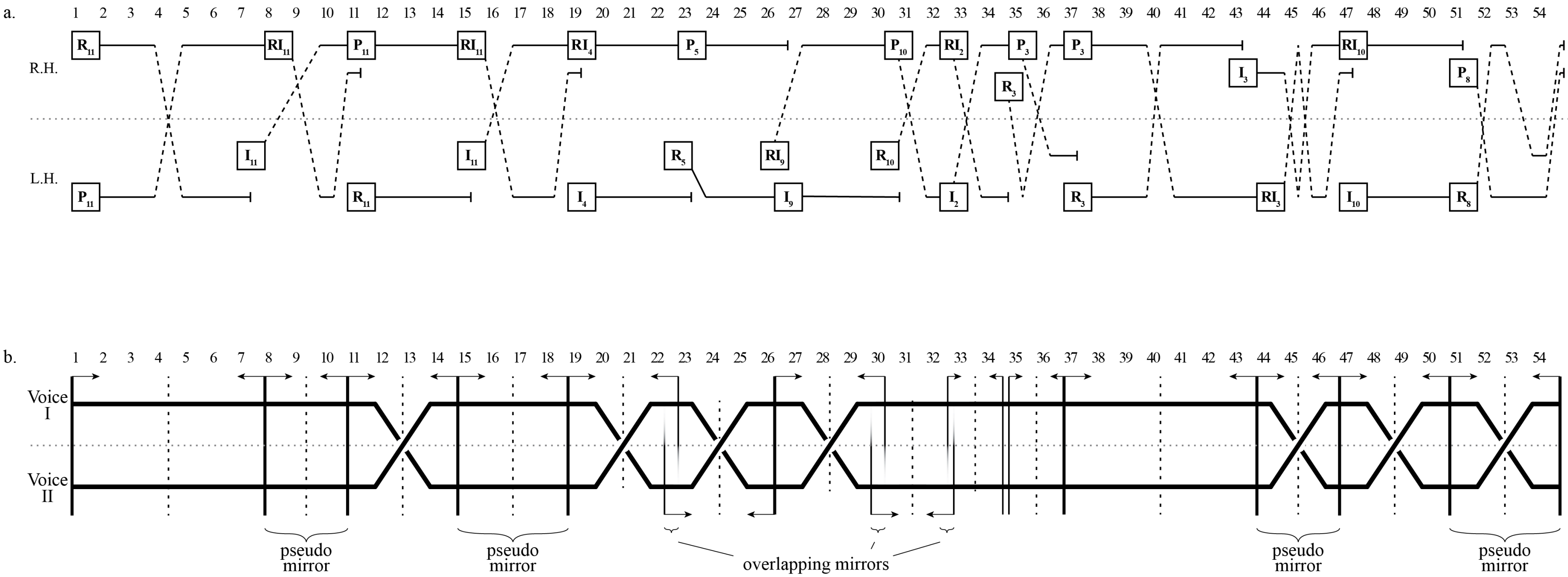
Example 13: Prime hexachordal combinatoriality between $P_{11}$ and $P_5$ in Webern's Op. 27, No. 1.

This hexachordal combinatoriality between rows $P_{11}$ and $P_5$ is perhaps the most audibly convincing relationship, above even the overarching sc(016) theory. It seems to my ears that the relationship between the eleven-ness of the expository section and $P_5$ of the development is simply that their hexachords sound very much alike.

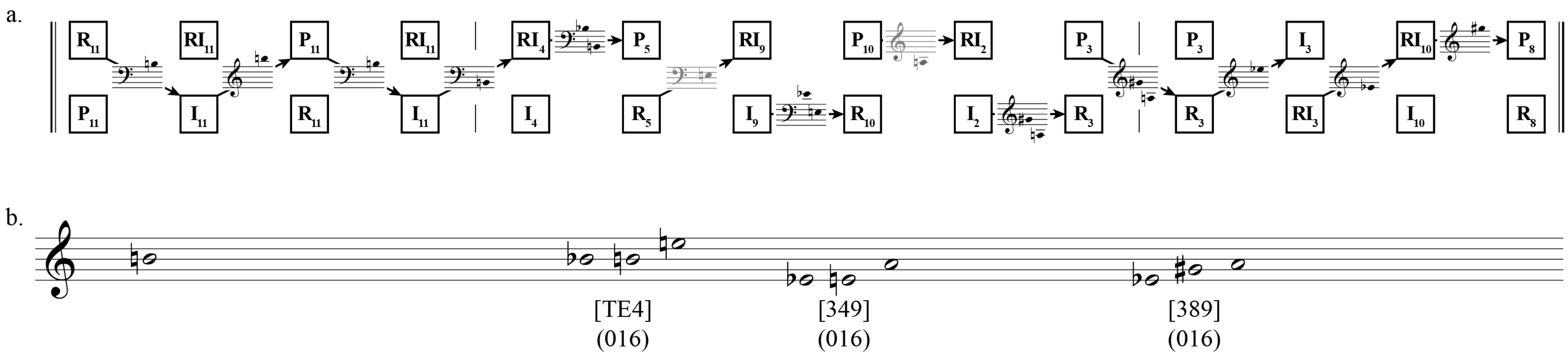
Like Webern's mirror constructions, this paper returns to the beginning with the question of the importance of symmetry to deeper structural elements in the Opus 27, No. 1. I have tried to demonstrate that while they are audible to the listener, intriguing for music theorists, and provide a sense of development in the piece, the palindrome does not guide the unfolding of form and harmony. Rhythmic patterns and tempo indications, while modeled on mirrors and canons, play a large role in dictating form. Likewise, the set class trichord sc(016) and hexachordal combinatoriality help explain the progression of serial permutations throughout the movement. Some questions remain about the importance of these elements in the Opus 27. The problem of the title, indicating a theme with variations, has gone unanswered. The importance of atonal set class theory in the remaining two movements, and in particular, the presence of sc(016) is also an area for more exploration. Perhaps the allure of the palindrome for the theorist will wane, much as it seems to have done in Webern's own thinking, and some new clarity might emerge regarding Webern's use of non-symmetrical forces in his later works.

# Appendix A:

## Larger Examples




Example 5: Showing a map of permutations, voice exchanges, and mirror points in Webern's Op. 27, No. 1.




Example 9: Elision of pitches in adjacent rows in Webern's Op. 27, No. 1

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