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An Analysis of Anton Webern's Variationen Op. 27, No. 1

Examining Anton Webern's Variationen Op. 27, one could identify his strict application of serialism in the composition of the tone row and its permutations. As a neuroscientist yourself, you will appreciate how mathematically coherent his work is, not only in pitch-class and its intervallic relationships but also in rhythm and geometry as we explore and analyze this movement of the work in depth. Besides, you would come to appreciate Webern's regard for traditional forms such as the Sonata form although this work is primarily a composition of variations. Hopefully, this essay will reveal to you the shreds of evidence supporting this claim.

Although we will be focussing primarily on the first movement, it is important to note that all three movements of the work are well-linked as a whole. The tone row employed in the first movement would not be distinct if you had not looked at the third movement. The row <3, 11, 10, 2, 1, 0, 6, 4, 7, 5, 9, 8> is presented right before your eyes in the first five measures of the third movement, as shown in **Example 1**.



Perhaps Webern had purposefully not revealed the tone row, which acts as the theme of the variation, until the end. This method seems to reflect the trait of Debussy who revealed the title of his work and what it represents only at the end of his composition. In the 3^{rd} movement, which he had composed first, variations include permutations of I3, R8, P4, and even combinatorial of P2 in m. 14 – order 1 to 6 – and m. 15 – order 7 to 12 etc. that are associated with the tone row is evident, however, I will not delve into it as this is not the paper's focus. With the tone row, we can now construct the matrix, shown in **Diagram 1**, which contains all the permutations of the row.

3	11	10	2	1	0	6	4	7	5	9	8
7	3	2	6	5	4	10	8	11	9	1	0
8	4	3	7	6	5	11	9	0	10	2	1
4	0	11	3	2	1	7	5	8	6	10	9
5	1	0	4	3	2	8	6	9	7	11	10
6	2	1	5	4	3	9	7	10	8	0	11
0	8	7	11	10	9	3	1	4	2	6	5
2	10	9	1	0	11	5	3	6	4	8	7
11	7	6	10	9	8	2	0	3	1	5	4
1	9	8	0	11	10	4	2	5	3	7	6
9	5	4	8	7	6	0	10	1	11	3	2
10	6	5	9	8	7	1	11	2	0	4	3

Diagram	1:	Matrix	for	Variationen	Op. 27
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It is also worth noting that the first section of the composition's second movement takes the retrograde versions, R3 and RI3 from m. 1 to m.6, and R10 and R18 from m. 6 to m. 11, and so on and so forth, further proves the applicability of the matrix in the entire work.

Back to the first movement, you will immediately realize the symmetrical aspect of the piece, a palindrome. As shown in **Example 2** below, with the mirror point as the yellow line, which will be used later in other examples as well, it is clear the last half-bar of m. 4 to m. 7, is the exact retrograde of the first 3 ½ bars, and the 16th rests are also retrograded in these 7 bars.



The 16th beat rests at the beginning and the end of the phrase in m. 7 corresponds to the augmented form in quarter-beat and the half-beat rests at the beginning and at the end of the phrase in m. 5 of the last movement; and a quarter-beat rest on the right hand in m. 1, not considering the anacrusis at the beginning, and eight-beat rest on the left hand in m. 6 at the end of the phrase of the second movement, further substantiating how Webern linked the entire work as one. You also see how these rests were augmented from the 1st movement to the last, the geometry of silence

music, evidentially. The aesthetic look of the score looks impressive but the sonority is really what makes the difference. Even with silences or rests, especially with the first bar syncopated by a 16th beat rest, unexplainably the silence provided a strongly felt internalized down-beat, an artistry in composition. With the tone row, starting with R11 on the right hand (RH), and P11 on the left hand (LH), we can label the order of the pitch classes accordingly as you can see in **Example 3**.



Another important feature that I wish to highlight to you is the geometry of the piece. Besides being symmetrical in combining the permutations in simultaneity, making each corresponding row contrapuntal to the other, Webern cleverly maneuvers the tone row from one hand crisscrossing at m. 4 to the other in the pitch class order of the tone row at the mirror point, thus creating an interesting auditory sensation not only for audience but performer alike. From the beginning, you will hear and see as you play the piano, a dyad diminishes to a single pitch in the first four bars, and in the next, expands from a single pitch to a dyad. Looking at the order <4, 5, 11> to <6, 7, 1> in m. 1 and 2, you get prime form (016) for both sets and in m. 3 and 4, <9, E, 3> to <0, 2, 8>, you get prime form (026), further giving a sonority of expansion in the interval. See **Example 4**.

Example 4: Intervallic Relationship



Listening to the intervallic movements, one can hear the contraction and expansion of texture, and texture was a device Webern used to dramatize his works. Bearing in mind that these seven bars, m. 1 to m. 7 formed the first subject of the Sonata form, in R11 on the RH and P11 on the LH. The hexachords of the first two six pitch-class groupings are (012368) and (012467), then successively in the retrograde, (012467) and (012368), and these hexachords complement each other with the same intervallic content, i.e., they have an isomeric relation or Z-relation in Joseph N. Straus' Set Class theory. These returned at the Recapitulation, Section A' which binds the piece.

The second subject starts from m. 8 to m. 11, in RI11 on the RH, and corresponds to I11 on the LH. Please also see that the common note between the first and second subject is PC11, or B-natural in m. 7, the PC in the first order of I11. See **Example 5**.

Example 5: Second Subject



Webern used this common note as a hinge or a link in a chain, to weave section A of the Sonata form together. As discussed above, the methodologies used in composition are similar for the second subject, except that we see that there are fewer bars because, at the mirror point at m. 9, instead of dyads, we have triads either diminishing or expanding to single pitches. As for the pitch-class set, due to the order of the pitch-classes, beautifully crafted, we have on the RH, (0146) expanding to (0167), creating musical growth in intervals and atonal voice leading. As for the rhythmic geometry, the structure is reiterated, perfectly symmetrical in pitch classes and the movements - on the RH, reduction of dyads to single pitch and after the mirror, the retrograde, likewise on the LH – and of rests, and rhythm too. Emphasis should be placed on the shared common notes. At the mirror point, we have PC10 and PC 7. As before, we have PC11 at the end of the permutation in m. 11 as a chain link.

As I have alluded to the structure of the piece resembles the Sonata form, the first and the second subjects are repeated, but with slight differences. Like in his other works, Webern was immersed in the idea of confining his musical ideas in geometry. In the first movement of this work, he had confined each section to eighteen bars, i.e., Section A (Exposition) – m. 1 to m. 18, Section B (Development) m. 19 to 36, and lastly Section A' (Recapitulation) – m. 37 to m. 54. This idea was also used in the second and third movements of the work, both segmented by eleven bars. Because of this self-imposed restriction, which was intentional to create a geometrically robust work, compared to the beginning, you would realize that the rhythm of the repeated section had been reworked with rhythmically faster exchanges as shown in **Example 6**.



Example 6: Repeated First Subject

But Webern retained the integrity of the geometry, i.e. symmetry of rhythm and the tone rows, except that the RH and LH in the first subject have swapped for performance varieties. With the diminished rhythmic pattern, not only do we hear the expansion of dyads to tetrachords, but the musical progression and harmonic rhythm also quickens. This provides a contrast in expression and interpretation in Section A of the work, though in this aspect, it is unlike the rigidity of the traditional sonata form. As before, the common note of PC11 is employed at the end of the A Section to link to the B section or the Development section. Take note that we have common notes PC7 and PC10 in this phrase too. With this, in terms of tone row permutation pairing in Section A, we see Webern had used R11 & P11, I11 & RI11, P11 & R111, and the number '11' states not only the permutations that he used, is also the pitch-class linking each permutation and section.

The Development section begins from m. 19 and ends in m. 36 with permutations RI4 and I4, and like before, a total of 18 bars. I opined that it is like the development section as it circles through multiple changes in permutations of the tone row and changes to the rhythmic component, very much like modulations through several keys in the sonata form. There are no traditional harmonic progressions in this case due to the atonality and application of strict serialism. Similarly, to Section A, Webern retained the integrity of his compositional methods, in geometry pertaining to tone row permutations pairing, rhythmic patterns both in pitch classes and rests, and symmetry. See **Example 7** and you will see that these ideas have been retained.



Example 7: Compositional Methods Retained

Something apparently that had developed from Section A is that the pitch classes between RH and LH are in the same octave. Playing this as a performer, you will see your hands interchanged at the center of the piano, as if they have been joined unlike in Section A where they were clearly separated, and this is captivating for the audience to watch and listen to and interesting for the performer. Listing the common notes, we have PC11 from the previous section, and PC10 and PC11 in m. 22 and m. 23, again serve as linking notes to the next phrase. Besides that, there are note groups of three pitch classes, as can be seen in m. 19 and m. 22, whereas it was two in the previous section. These three-note groupings form the intervallic form (016), the same as the beginning of the work, which is another clever method to weave the work as one. Furthermore, if you analyze the hexachord within m. 19, you get (012368), and if we include the first 32nd PC0 and PC3, we get an octachord of (01234678), a combination of two hexachords we had before (012368) and (012467), perhaps another method Webern employed to develop the thematic material in the first section. Again, this intervallic relationship and sonorities link both Sections A and B together as one would expect between the Exposition and Development sections of the sonata form. See **Example 8**.





The three-note grouping of the set (016) repeats itself at the end of m. 22 and at m. 26 as shown in **Example 9**, not only is the same pitch class set at the beginning, which binds the work, is also a repeating motif employed in this section.





I have indicated in the example, in m. 26, that there is a note that is not in any order of both permutations, i.e. PC4. This provides evidence that Webern is more concerned with form and structure, especially in the symmetrical or palindromic aspect of his music. To have a perfect retrograde or mirroring of this phrase, he would have to forego the strict application of serialism by adding that extra note.

Identical to the traditional development section that consists of transpositions, modulations, and uncertainties in harmonic structure, in this work, we see the constant shifts in permutations and transpositions while working through identical P5 and R5, and incrementally with a transposition of T_5 , we have RI9 and I9, P10 and R10, RI2 and I2, and lastly P3 and R3. Mathematically, the development formulas are RI_{X+5} contrapuntally over I_{X+5}, and P_{X+5} contrapuntally over I_{X+5}, further proving the mathematical coherence of the work. So, from the beginning, we started with PC11 or B-natural, and we have progressed to PC3, PC5, PC9, PC10, PC2, and ending in PC4. These PCs will reveal a Circle of 4ths transposition, characteristic of a development section, unsettling in permutations as we move on. Essentially, the common notes indicated in the examples that I have pointed out to you, all correlate to this Circle of 4ths as well. So far, we have PC11, PC10, and PC7 as common notes.

Example 10 shows the next phrase from the end of m. 26 to m. 30 using RI9 and I9 of the matrix, a transposition of a perfect 4th from P5 and R5 of the previous phrase. The transposition, which mimics a sequence in a developmental part of the music, will be audible to anyone especially as it is accompanied by repeating the same rhythmic pattern as the prior note group.

Example 10: Transposition of Perfect 4th



As before, in this phrase, the compositional methodologies are the same, both hands interchange at the mirror point in m. 28 as denoted by the yellow line, and play the exact same pitches in retrograde form. The common notes here that link the subsequent phrase are PC3 and PC4 in m. 30, and the intervallic set of (016) at the beginning and the end of the phrase closes the phrase musically.

Moving from there, in an attempt to confine himself to eighteen bars in this section in a similar fashion as Section A, Webern compressed the rhythmic patterns, transforming the motific structures as it approached the Recapitulation section of the piece. In permutations P10 and R10, the rhythmic variation takes the form of 32nd note values, giving a sense of urgency and instability, again, characterizing a development section as it pushes toward the end of the section. Not forgetting the increase in dynamic from forte to fortissimo to dramatize the section. Hands crisscrossing at the mirror point in m. 31 as shown in **Example 11**, a performance modality of the movement evidently, creating not only symmetry in sonority but also in sight, which creates excitement in performance. A common note here is PC7 in m. 31.





Very quickly, the variation as we see above takes the RI2 with I2 permutation and P3 with R3, using the transposition formula as mentioned before. See **Example 12**. Note the common note PC5 in m. 33 and PC0 in m. 36 which are Perfect 4th apart in these two phrases, and PC8 and PC9 in m. 34 to link the phrases together.



The sense of urgency is soothed by the slowing down and diminuendo towards the end of the section. Another feature here that is noticeable is the three-note groupings at the mirror point, which are marked with staccato articulations, informing the audience clearly of where the retrogrades happen. By the end of this section, we have accumulated common notes in Section A – PC11 and Section B – PC10, PC3, PC4, PC7, PC5, PC8, PC9, and PC0. In terms of the order of permutations as seen in the matrix, we have in Section A utilizing the horizontal row of the matrix, i.e., P and R

first then the vertical row, i.e. I and RI; in Section B, I and RI first, then P and R, alternating in that geometrical manner until the end of the sections.

In Section A' or the Recapitulation, the rhythmic pattern of Section A returns, but this time starting in the same permutations as the previous permutation, P3 and R3 weaving the sections together. Moreover, provides new variations in different permutations. Though it is different from the traditional sonata form, the intervallic relationship is the same as Section A, i.e., the hexachords sets are the same, i.e., (012368) and (012467) with a Z-relation, even at the retrograde in m. 41 ad m. 42 in the sequence (012467) and then (012368), further proving that this section is the recapitulation of Section A, although, in the beginning, Webern used P11 and R11, here, he used permutations P3 and R3, closely referencing relationship. I believe Webern had in mind to retain the isomeric relation of these two pitch-class sets in order to bind the two sections, i.e. Section A and A' together with matching textures auditorily. Additionally, the geometry in the rhythmic pattern, silences, and motific structures are the same, like in a recapitulation. See Example 13.



Example 13: Similar Hexachords and Geometry as Beginning

If we assume that the structure of the work is like the classical sonata form, in the Exposition, the first subject should modulate to the second subject to a different key, usually to the dominant key. However, in this work, Webern used the permutations that begin with PC11 for both subjects. In the Recapitulation, with the classical sonata form, both subjects should be in the same key, but in this work, the permutation of the first subject starts with PC3 and in the second, the permutation starts with PC8, modulating to a perfect 4th. I believe he had deliberately swapped the modulations of the sonata form around, attempting to vary the overall structure of the movement. As can be seen, Webern not only varied the thematic materials in the first section, but he also varied the traditional musical forms to create variations at all levels for this work.

Towards the end of the movement, the same compositional ideas were retained for the cohesiveness of the movement. However, at the end of the movement, there is a clear distinct break from the section, especially with the ritardando which elongates the silence in between, the idea is clear, that Webern wanted this to be like a Codetta and reinforces the idea with the same intervallic relationship as the first hexachord of the piece, (012368). See **Example 14**.



Example 14: Towards the Codetta

As it is obvious at the codetta, Webern created the same hexachord as the beginning (012368). This proves that Webern placed emphasis on the balance of sonorities and the relations between musical phrases and sections, crafting the sequence of pitch classes of the tone rows to achieve his compositional idea, which in this case, to align them vertically reflecting the pitch-class set to achieve the codetta idea. Evidently, the last hexachord, as well as the one in the beginning, contain augmented 4th intervals within, so that the sonorities can be inferential and associated with each other, linking the entire work as a whole. The idea of the gesture as a codetta at the

end of the movement is also plainly presented before our eyes due to the clearly separated trichords.

Common notes wise, we have here PC3, PC8, PC9 and PC0. PC0, PC9, and PC8 as the last common notes, identify themselves as Section B with the same PC as the last three common notes, nicely ending the recapitulation and the movement. I reiterate my point here, and that is, in terms of mathematics and geometry in the rhythm of pitches and silences, pitch classes, and their intervals, the work is coherent, compositionally intelligent, and highly comprehensible.

As for the common notes in the composition, I allude that Webern was in fact thinking of the Circle of 4th, a compositional reference to the traditional mode of transposition. Section A: B, Section B: B-flat, E-flat, E, G, F, C, G-sharp or A-flat, A, and Section A': E-flat, B, D, E-flat, G-sharp or A-flat, A and C. You can see that they are indeed a Circle of 4th: B, E, A, D, G, C, F, B-flat, E-flat and A-flat.

As I have proven to you, Webern had a pattern or sequence to use the permutations of the matrix to structure his work which I summarized in **Table 1**. It is evident that in Section A, he used the horizontal row of the matrix first, then the vertical row; in Section B, the vertical row then the horizontal row; and lastly, in Section C, he alternated the sequence, starting with horizontal row, then vertical, and vertical next, and ends with the horizontal row of the matrix.

Sect	Permutation		LH	РС	Common Notes
Α	i. Retrograde and Prime		P11	В	B-natural
	ii. Retrograde-Inversion and Inversion	RI11	I11	В	
	iii. Prime and Retrograde	P11	R11	В	
	iv. Retrograde-Inversion and Inversion	RI11	I11	В	
В	i. Retrograde-Inversion and Inversion		I4	Е	B-natural, B-flat, E-
	ii. Prime and Retrograde		R5	F	flat, E-natural, G-
	iii. Retrograde-Inversion and Inversion		I9	A-flat	natural, F-natural, G-
	iv. Prime and Retrograde		R10	B-flat	sharp, A-natural, C-
	v. Retrograde-Inversion and Inversion		I2	D	natural
	vi. Prime and Retrograde	P3	R3	E-flat	
A'	i. Prime and Retrograde	P3	R3	E-flat	G-sharp, A-natural, E-
	ii. Inversion and Retrograde-Inversion		RI3	E-flat	flat, D-natural, G-
	iii. Retrograde-Inversion and Inversion		I8	A-flat	sharp, A-natural, C-
	iv. Prime and Retrograde.		R8	A-flat	natural

Table 1: Permutations used in Op. 27

I have also included columns indicating the pitch classes and common notes found in the piece so that you can see that they are relative to each other in a Circle of 4th. Evidently, Webern was particularly interested in musical geometry and mathematics, remodeling existing musical structures to better accentuate his musical ideas.

I hope by now, you will realize that the first movement takes a form closely associated with the Sonata form, using variations of the tone row as the compositional material. Although the Ternary Form may seem plausible, the conventions of the Sonata Form are evident as I have explained. Do also note that in Section B, just like the Development section of the Sonata form, there are more permutations and transpositions. Let me conclude here with a diagram of my perception of this work, that though it is a movement of variations, it resides fittingly

in a Sonata Form structure. See Table 2.

	Section A		See	ction B	Section A' Recapitulation			
	Exposition		Deve	lopment				
1st and 2nd sub	jects are repeated,	except that in the	Rhythmic devel	opment while	Rhythmic motifs, patterns, and movements reflect			
repeat, rhythmi	c patterns change t	o accommodate	retaining palind	rome. Unsettling	Section A. Codetta ending with Trichords (012368)			
eighteen bars po	er section.		and frequent tra	nspositions of	same as the first bar.			
			permutations.					
1st Subject	m. 1 - m. 7	R11 / P11	m. 19 - m. 22	RI4 / I4	1st Subject	m. 37 - m. 43	P3 / R3	
2nd Subject	m. 8 - m. 11	RI11 / I11	m. 22 - m. 26	P5 / R5	2nd Subject	m. 43 - m. 47	I3 / RI3	
1st Subject	m. 11 - m. 15	P11 / R11	m. 26 - m. 30	RI9 / I9	1st Subject	m. 47 - m. 51	RI8 / I8	
2nd Subject	m. 15 - m. 18	RI11 / I11	m. 30 - m. 32	P10 / R10	2nd Subject	m. 51 - m. 54	P8 / R8	
			m. 32 - m. 34	RI2 / I2	Codetta	m. 53 - m. 54		
			m. 34 - m. 36	P3 / R3				

Table 2: Variations in Sonata Form

With the above analysis, I wish to allude to you that Webern's compositional techniques employed in crafting the Variationen Op. 27, No. 1 were intentionally planned with a clear geometry in mind. Not only in the sonorities of the chords, PCs, and intervals that he used carefully chosen, but the symmetries of rhythms, motifs, notes, and even silences, were mathematically coherent so that his work could be interwoven as a piece rather than several segments without any logical connection. He was mindful in using the permutations of the tone row such that there is contrapuntal simultaneity in the musical phrases, which are retrograded or mirrored at the mid-points of the musical phrases. There are variations in all aspects, even in musical form, that are the essence of the work; interesting lines that are musically and aesthetically appealing for both performers and audiences alike.