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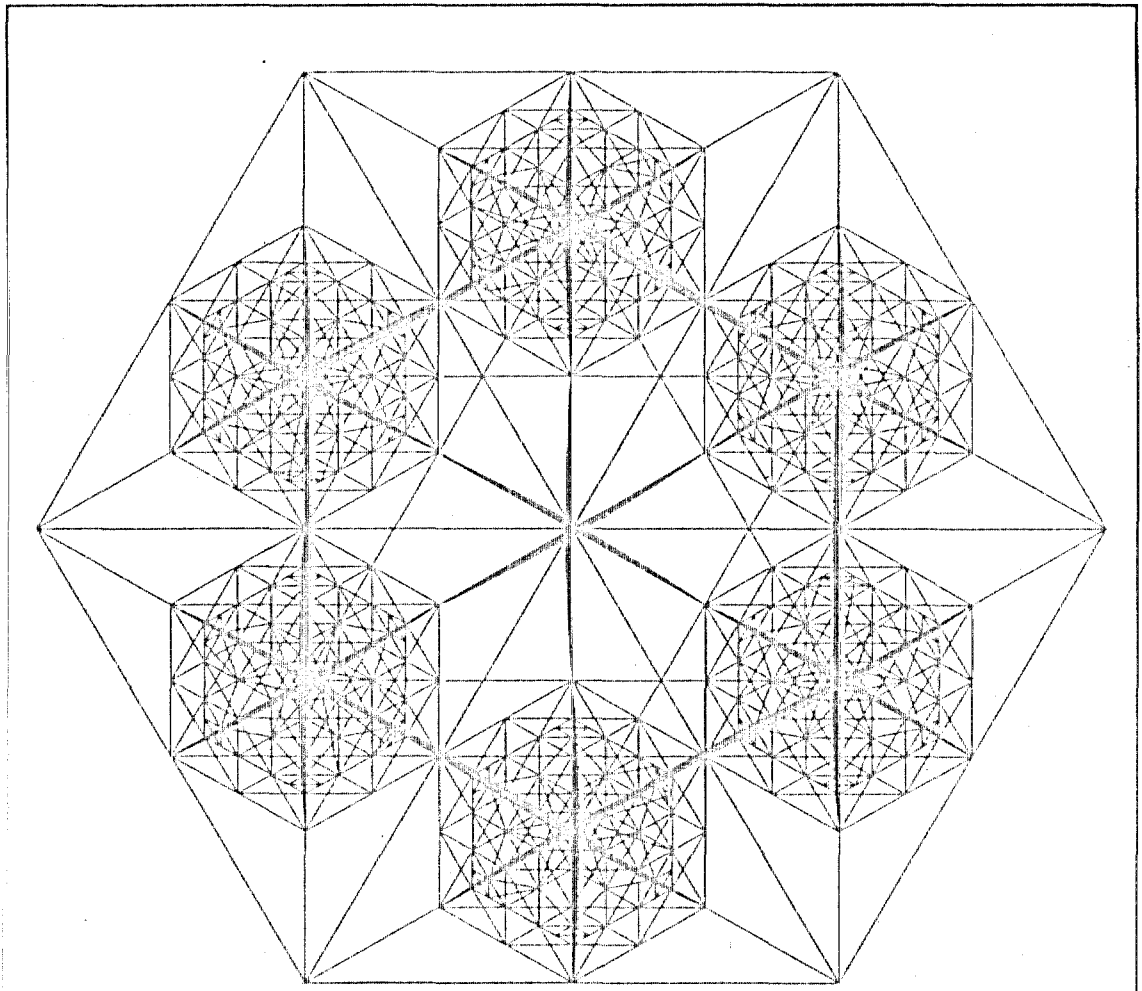

Large synergetical structure on hexagonal figure
Aerial view

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SATOR AREPO TENET OPERA ROTAS OR SYMMETRICAL STRUCTURES IN WEBERN'S *REIHEN*

Katalin Fittler

Musician, piano teacher, (b. Mosonmagyaróvár, Hungary, 1952).
Address: Hungarian Broadcasting, Budapest, H-1800 Hungary; Music High School, Győr.
Fields of interest: Paleography, semantics, symbols in music.
Publications: Mozart's Freemasonic Compositions, *Magyar Zene*, 1980, 2; Beethoven's Symphonies in Liszt's Transcription, *Magyar Zene*, 1986, 1.

Abstract: *Anton Webern (1883-1945), representative of the so-called* Second Viennese School, *was preoccupied throughout his life with questions of symmetry. He unites consciously the traditional organizing principles with a new form of symmetry. The question arises whether it is comprehensible to the ear. And what is its meaning, if we can not hear these symmetrical correspondences? Webern's ouvre proves to be an ideal* raw material *to such an investigation.*

The word *symmetry* at first elicits visual associations. Both the axial and central symmetries are attached to sight. When we place the schematic picture of a four-leaf clover in a system of coordinates, leaf no. 1 is transposed into leaf no. 2 across the horizontal axis, and into leaf no. 3 across the vertical axis. Leaf no. 4 is the centrally symmetrical image of the first one, but the same formation is arrived at if we mirror axially leaf no. 2 or no. 3.

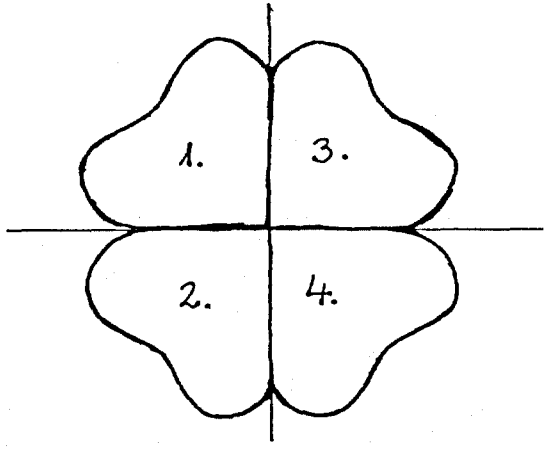

Figure 1

We have *time* at our disposal to perceive the formations in space. But hat happens when we are faced with a temporal structure?

Being well aware of Goethe's *Farbenlehre*, Anton Webern, one of the exponents of the *second Viennese school* drew a parallel between the visual and aural phenomena. Under Goethe's definition, "colour is the regular nature concerning the sense of vision". Taking this statement as his point of departure, Webern said in a series of lectures: "As the difference between colour and music is one of degree and not of substance, one might as well say that music is the regular nature concerning the sense of the ear." (Webern, 1965, p. 19.)

Webern was preoccupied with the question of symmetry throughout his life. The old Latin saying I chose for the title of this paper means: "Arepo (a first name) the sower keeps the work a-turning" (= turns up the soil). As the next figure shows, the five five-letter words can be arranged in a 'magic square': whichever direction one starts reading it, the result is always the same.

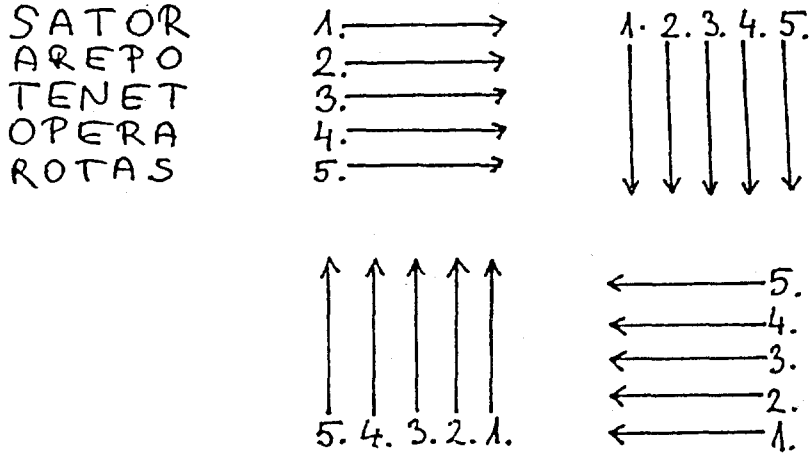

Figure 2

This was the quotation Webern chose to finish another of his series of lectures, the one that was published by Willi Reich under the title *The road to composing with 12 notes* (see in Webern, 1965).

I do not think one has to be a musician to recognize that musical notation, too, is a sort of system of coordinates. We mark the height of the tones along the vertical axis and their temporal duration along the horizontal one. We needn't draw the five staves to make it obvious how a three-note segment can be 'mirrored'.

Note 1 is the 'low one', note 2 the 'high one' and note 3 the 'lower neighbour of the high one'. With the help of the horizontal axis the low note becomes high and the high one low. If we map them over the vertical axis of the coordinate system, the three notes will follow one another in reverse order, 'crabwise'. The fourth variation, like in the case of the four-leaf clover, can be derived in different ways. If we

call formation 2 'inversion', the third formula is the 'retrograde' and the fourth the 'retrograde inversion'.

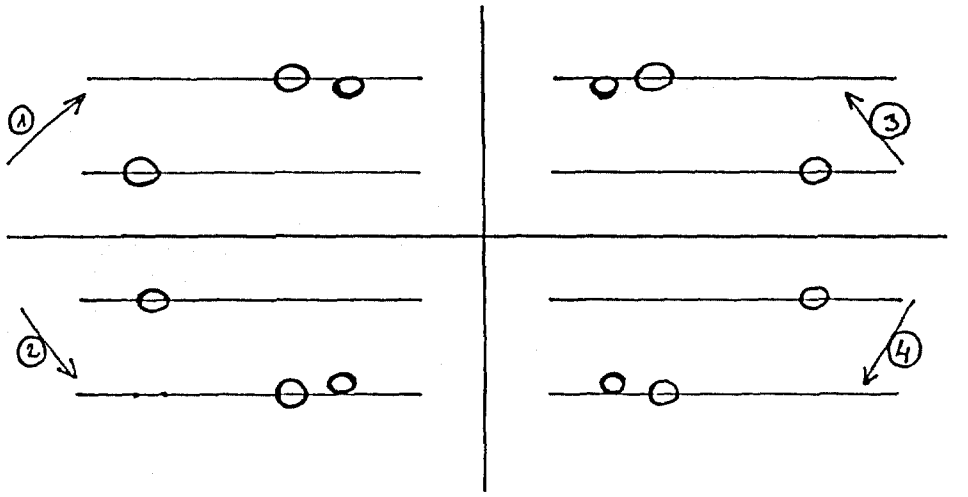

Figure 3

It poses a special problem that in the case of so-called 'temporal' arts the composition progresses in time, so the recognition of such structures by ear is extremely difficult. (Remember that we have *time* at our disposal for the comprehension of a structure in space; a building can be walked round from lots of directions, can't it?) When a tune or a formal unit returns unchanged or with slight modification, we recognize it easily as we are faced with repetition. Indicating the repetitions with letters, we get:

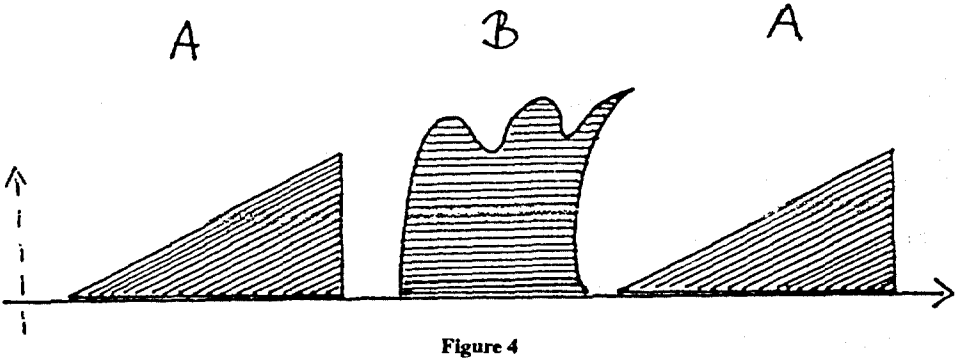

Figure 4

By contrast, even the visual image of a process reversed in time is more complicated:

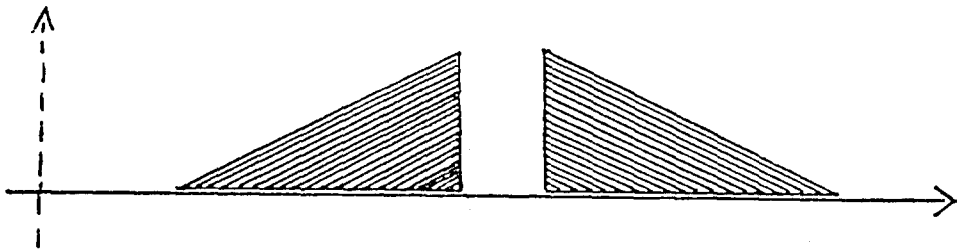

Figure 5

It is like mirror writing: though we can see just as well the inverse of the written passage, we need several times as much time to comprehend it than to read the passage in the normal order. Or an even more marked example is a recorded text played backwards, when the sequence of phonemes and words is turned all the way round, causing serious difficulties in 'deciphering' the otherwise comprehensible text.

But one can cite several examples of this type of structuring, of the employment of such links, from various periods of the history of music. In other words, it is not a new aspiration of composers at all to create a singular and stable *system* in a composition or a movement via connections not directly comprehensible to the ear.

Webern strove to create substantial connections in all layers of music. "Let's always speak of the same thing – but always in another way." This aspiration of his was often put into words, and no less is it evidenced by his compositions.

The method of composition of the second Viennese school is based on the 'serial technique'. Schoenberg the teacher and his two disciples around the same age, Berg and Webern, all arrived at different results when trying to give shape to one and the same substance.

All who have read Thomas Mann's *Doctor Faustus* know a lot of the serial technique. In its 22nd chapter Mann recounts the technique invented by Schoenberg as that of his protagonist Adrian Leverkühn, which he acknowledges in a note appended to the book. Technically, the ultimate aim is to emancipate all the twelve chromatic semi-tones within the octave. To achieve this, an identical number of them must be employed. This, however, should not remain at the quantitative level but should become a factor of quality: the *sequence* of their occurrence should also be determined. "A sentence of twelve syllables", that is Adrian Leverkühn's fixed idea; and that is the idea that called to life the row (*Reihe*).

Let us now see a music example.

The basis for Webern's last completed work, the *Second Cantata* is the following row:

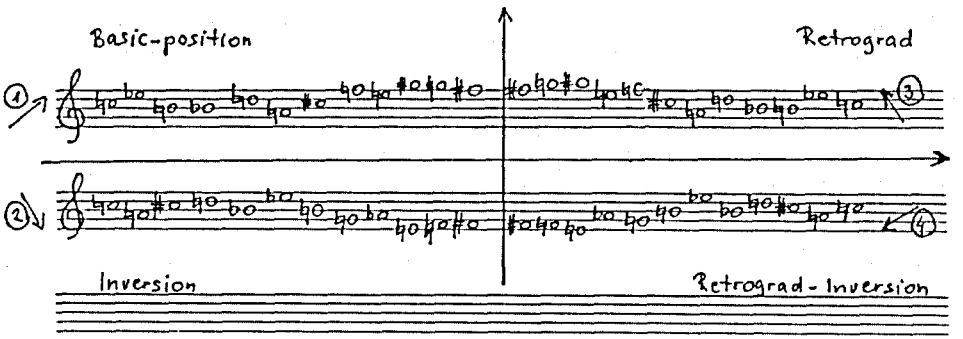

Figure 6

The upper left-hand quarter of the figure contains the 'row' condensed in the smallest possible space, a single octave, while the other three series in the system of coordinates can be easily interpreted in view of the transpositions of the four-leaf clover and the three-note formation: as the superscribed numerals indicate, the figure projected across the horizontal axis is called the 'inversion', the example on the upper right progresses in 'retrograde motion', while the fourth example that can be produced in various ways is the 'retrograde inversion'. This is as if we were moving in different directions within the magic square. It is the same, but always in a different way. A row can take on four forms, and as they can be built on all of the 12 semi-tones, 48 modifications are available to the composer. Such is then the organizing principle of one composition. But how does a row like that come to life? Webern offered the following answer to this question:

"A row is not arbitrary, not accidental; it is arranged upon certain considerations. Certain – formal aspects must be considered, for example: steps of as many different intervals as possible; certain correspondences within the *Reihe*; symmetry, analogy, clustering (e.g. three times four, or four times three notes). Our *Reihen*, the rows of Schoenberg, Berg and myself, mostly came about so that we first had an idea in connection with the instinctively envisioned work, and then we thoroughly deliberated it, exactly the same way as the genesis of Beethoven's themes can be retraced in his sketch-books. It's inspiration, if you please." (Webern, 1965, p 95.)

Let me point out a peculiar duality here. On the one hand, Webern was aware in his above-quoted lecture of 1932 that one of the most effective means to disorient the traditional sense of tonality was the use of non-recurrent, diverse intervals. On the other hand, he also formulated the problem that preoccupied him most among the members of the second Viennese school: the question of 'correspondences', symmetric structures. It is easy to see that the grouping of three times four or four times three notes, provided that it obtains a role in melodic construction, inspires a feeling of familiarity in the listener, even if the formulae are not repeated mechani-

cally but as various inversions or transpositions to different heights by the changing of the direction of the successive notes.

Scanning Webern's *Reihen*, we can find corresponding three-note clusters already in the very first ones. This need culminates in the rows of op. 24 and op. 29.

Borrowing Ernő Lendvai's term, let's call the scales built on the periodical repetition of a minor second and another interval scales of e.g. 1 : 2, 1 : 3 or 1 : 5 models. In both a segment – the so-called 1 : 3 'nucleus' – of such a scale is repeated, which is a unit interval of a minor second and the minor third consisting of three minor seconds.

In the case of Concerto op. 24, four variants of the first three-note figure bring about the *Reihe*:

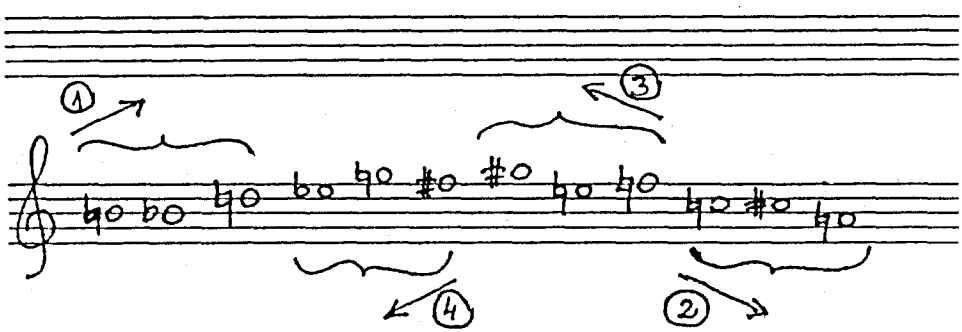

Figure 7

In Cantata No. 1 the row can be reduced to two triple formulae; its construction is: a_1, a_2, retrograde inversion$_2$, retrograde inversion$_1$. The row itself eventually comprises two complementary scales of '1 : 3 model' (Fig. 8).

It turns out from the sketches made for the planned opus No. 32: Webern had found another possibility to give shape to regularity. A three-note cell consists of chromatic notes; three successive descending or ascending notes are tied together. In such cases fewer options are available, exactly half as many. The four groups of three chromatic notes each look like in Figure 9.

The row of the String Quartet op. 28 requires special attention (Fig. 10).

This row can be divided into three times four notes. The first four-note cell recurs transposed in the third group, while the middle figure is its 'inversion'. What immediately strikes the eye is the symmetrical set of tones. The same row can be reinterpreted as three times four notes!

What is more, these symmetric relations are not only 'visible', but also more or less audible. The separation of the three-note cells is made sure, for example, at the beginning of Concerto op. 24, by the instrumentation: the four three-note cells are intoned by the oboe, flute, trumpet, and clarinet, like in Figure 11.

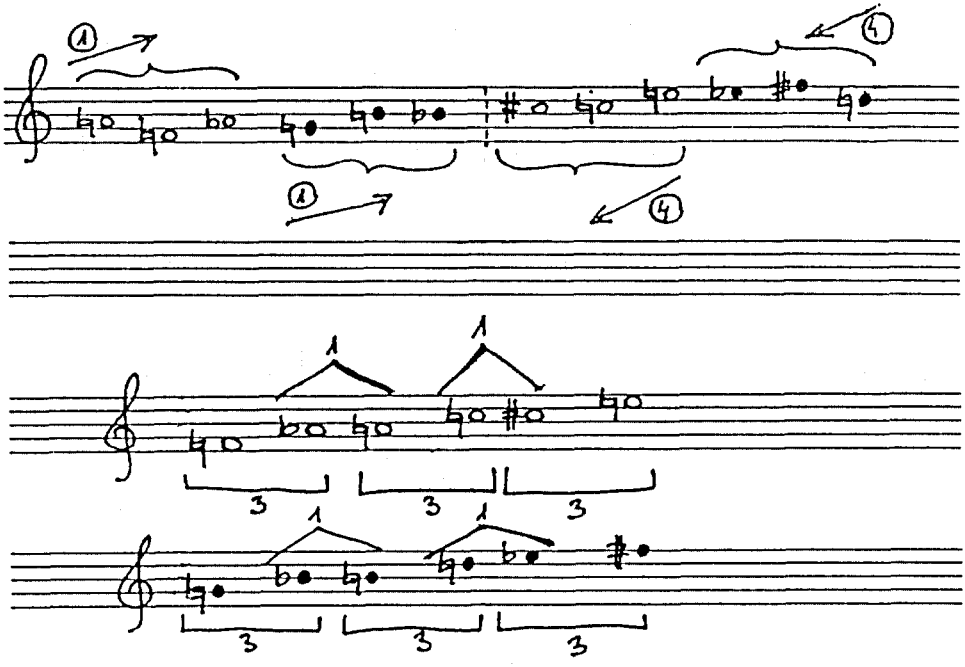

Figure 8

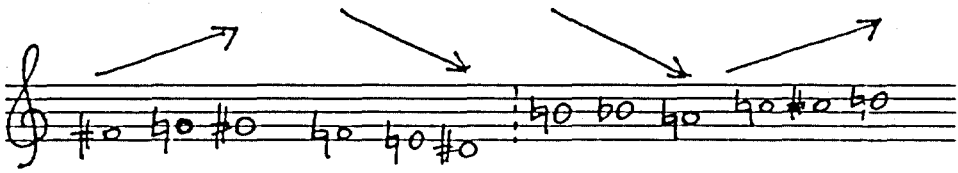

Figure 9

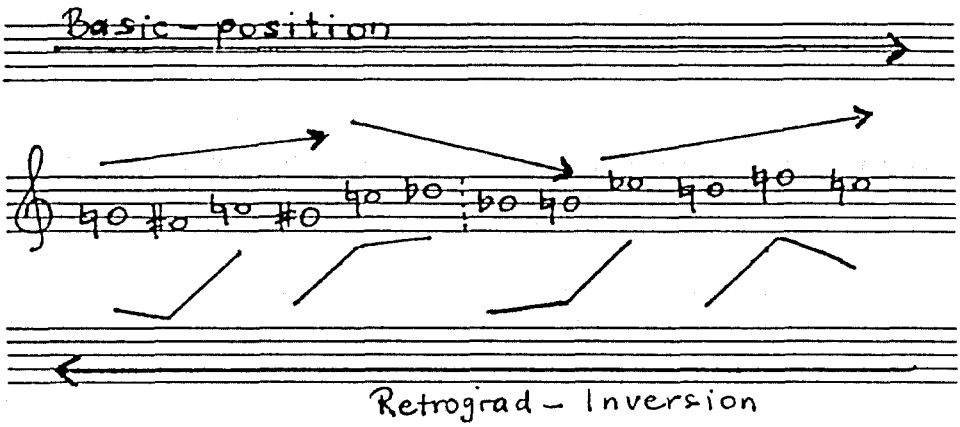

Figure 10

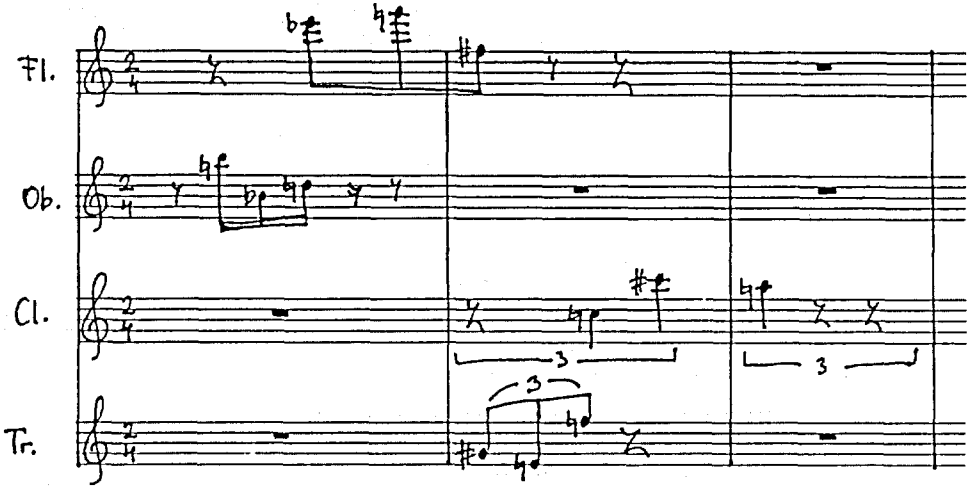

Figure 11

Let us take a closer look at the last work Webern completed. Cantata No. 2 is built on a row that lacks this type of correspondences. We got acquainted with the row itself in Figure 6.

In the fourth movement which was composed first, the four formulae start out from a single basic tone. As to its overall form, the movement is a four-part canon. According to the numbering of the leaves of the clover:

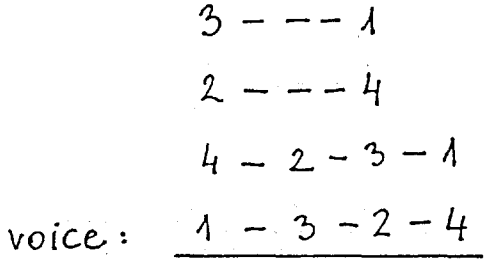

Figure 12

The joining of the rows is achieved by taking up the final note of one row as the initial note of the next row. The emancipation of the four different forms is also underscored by their frequency of occurrence: each occurs three times in the movement.

Let's quote Webern: "I read in Plato that *nomos*, or law, also meant tune. Now, let the tune (*recitativo*) that is sung by the soprano solo as the introduction to my composition be the *law* (*nomos*) of all that is to follow!" (Webern, 1965, p. 112.)

Nearly a year later, he wrote: "*Reihe* itself means law; yet it is not necessarily the *tune* as well. But as in my case it is, *Reihe* assumes a particular meaning, that of a

higher order, I should say, similarly to the chorale tunes in Bach's adaptation." (Webern, 1965, p. 113.)

The first movement employs the same technique. By contrast, the row of movement V with varying basic notes makes it possible to join up the figures in several ways. Let's have a look at Figure 6 again. It reveals that two rows may actually merge so that the end of the first (basic) row coincide with the beginning of its retrograde inversion. The end of the row in retrograde inversion, in turn, can be interpreted as the beginning of another basic row. What again underlies this diversity of sound is a canonical structure which is hard to be perceived by the ear alone as the texture itself changed in the meantime: although we can see the recurrence in the structural analysis, we cannot actually hear it when only listening to it because what was first melody is turned into chord now and vice versa: what earlier seemed almost 'accidental', later becomes an important thematic element.

Movements II and III use up all the – 48 – possibilities of the row.

The closing movement is one of Webern's most treasured creations: he felt he had managed to create an intricate web of strict relations. True, the instruments do not have a single 'free tone', each instrumental fragment doubling ('coupling') one of the vocal sections. Each row is arranged on the basis of a whole-tone scale, which itself is an equidistant, symmetrical formula:

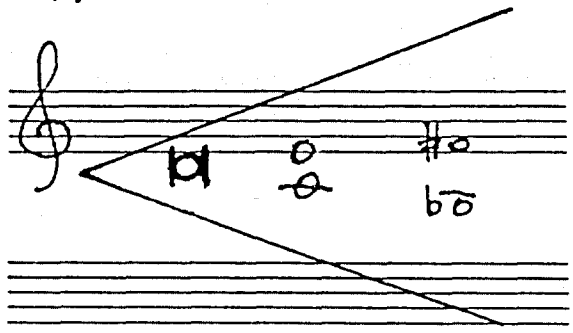

Figure 13

By way of conclusion, let me schematize the structure of this movement: the starting row is denoted by 12 numbers, so that with the help of this score the interlocking of the various forms could be read off (Figure 14).

In the final analysis, structural symmetry becomes the means of creating order – with the help of which dynamic sound can also be produced. There is therefore no antagonism between the static structure and the dynamic sound. Perhaps this short analysis will suffice confirm that Webern's last work displays signs of technical maturity rather than technical depletion, as several analysts seem to believe.

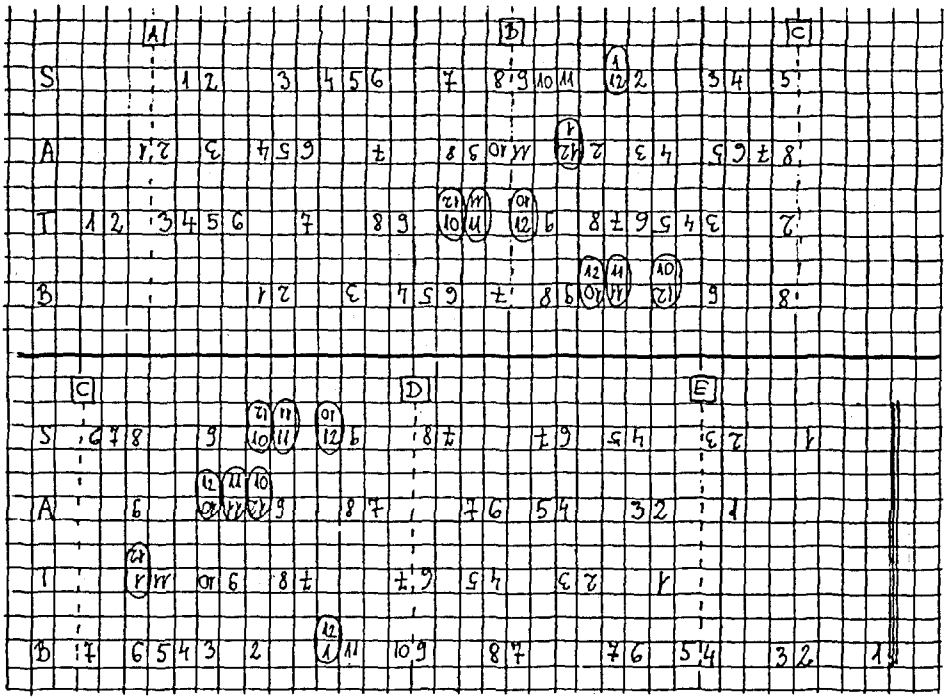

Figure 14

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Webern, A. (1965) *Előadások — Levelek — Irások*, [Lectures, Letters, Essays, in Hungarian; translated from German, In: Reich, W., ed., *Anton Webern — Wege zur neuen Musik*, Vienna: Universal Edition A. G., 1960], Budapest: Zeneműkiadó, 169 pp.