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STRAVINSKY, KRENEK AND SERIAL-ROTATIONAL TECHNIQUE

The article analyzes the serial-rotational foundation of the late Stravinsky's musical language. Particular attention is paid to creative links between Stravinsky and Krenek, which served as the basis for the Russian master's adaptation of the hexachordal rotational technique. Based on the analysis of Stravinsky's late works sketches, the evolution of his rotational seriality is traced. The universal system of indexation of Stravinsky's late serial-rotational scores, allowing to optimize their structural and intonational analysis, has been proposed.

Key words: *Stravinsky, Krenek, late works, serial-rotational technique, hexachordal rotation.*

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Стравінський, Кшенек та серійно-ротаційна техніка

У статті аналізується серійно-ротаційна основа музичної мови пізнього Стравінського. Особлива увага приділена творчим зв'язкам Стравінського та Кшенека, що слугували основою звернення російського майстра до техніки гексахордної ротації. На основі аналізу ескізів пізніх творів простежено еволюцію ротаційного елементу серійності Стравінського. Пропонується універсальна система індексації його пізніх серійно-ротаційних партитур, яка дозволяє оптимізувати їх структурно-інтонаційний аналіз.

Ключові слова: *Стравінський, Кшенек, пізня творчість, серійно-ротаційна техніка, гексахордна ротація.*

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В статье анализируется сериально-ротационная основа музыкального языка позднего Стравинского. Особое внимание уделено творческим связям Стравинского и Кшенека, послужившим основой для обращения русского мастера к технике гексахордной ротации. На основе анализа эскизов поздних произведений, прослеживается эволюция ротационного элемента сериальности Стравинского. Предлагается универсальная система индексации его поздних сериально-ротационных партитур, позволяющая оптимизировать их структурно-интонационный анализ.

Ключевые слова: *Стравинский, Кшенек, позднее творчество, сериально-ротационная техника, гексахордная ротация.*

In spite of the almost sixty-year tradition of analyzing the rotational component of Stravinsky's serial technique, presented in articles by M. Babbitt [1-3], J. Kohl [7],

M. Locanto and C. Jenkins [8], C. Mason [9, 10], A. Payne [11-13], P. Phillips [14], C. Spies [15-18], A. Whittall [26], and D. Young [27] and in the corresponding parts of studies by P.C. van den Toorn [22], R. Vlad [23], S. Walsh [24] and E. W. White [25], the "Stravinsky-Krenek" parallel has attracted the attention of only three scholars: N. Jers [6], C. Hogan [5] and J. Straus [19, 20]. The detailed analysis of Stravinsky's Krenek inspired serial-rotational technique was also included in my study "Late Works of I.F.Stravinsky" [4].

In the pages of *Dialogues and A Diary*, Stravinsky characterized Krenek as one of the greatest musicians of the 20th century, whose compositions influenced the late works of the Russian master: "I knew little of Krenek's music a decade ago, but I knew and liked the Symphonic Elegy for Strings and the *Lamentations of Jeremiah*. Perhaps my own *Threni* shows contact with the *Lamentations*" [21, p. 52]. In studying Stravinsky's serial-rotational technique that excerpt from *Dialogues and A Diary* is of special interest. The *Lamentatio Jeremiae Prophetarum* is a work that introduced to the world the technique of hexachordal rotation. As was made clear from Krenek's foreword to the published score, the essence of the hexachordal rotation consists of dividing the 12-tone series of a composition into two six-tone segments. Each of them can be reformed by diatonic and chromatic means. If the tones of any one of the hexachords can be designated by the numbers 1 to 6, then the process of its diatonic rotation appears in the form of the following number table:

1 2 3 4 5 6
2 3 4 5 6 1
3 4 5 6 1 2
4 5 6 1 2 3
5 6 1 2 3 4
6 1 2 3 4 5

The chromatic means of rotation is based on the construction of newly formed diatonic rotational models from the initial tone of the hexachord.

N. Jers begins one of the sections of his study by asserting the following: "The rotational technique, which Stravinsky, personally acquainted with Krenek, borrowed from him, is the technique of *Lamentatio*". In the next sentence the author quotes a fragment of an article by Krenek, published in a special edition of *Perspectives of New Music*, dedicated to the memory of Stravinsky: "He (Stravinsky – V.G.) studied especially my 'Lamentatio Jeremiae Prophetarum' carefully..." [6, p. 49]. An analogous thought is expressed by Krenek in a letter to C. Hogan, author of the article, "'Threni': Stravinsky's Debt to Krenek": "I know that he rather thoroughly studied my *Lamentatio Jeremiae Prophetarum*... when he worked on his *Threni*" [5, p. 22].

Krenek completed the composition of *Lamentatio Jeremiae Prophetarum* in 1941. Sixteen years later the score was published. Connected to Stravinsky through friendship, Krenek presented him with a copy of the printed score of *Lamentatio*. At the present time this copy is part of the Stravinsky Archive in the Paul Sacher Foundation. Its title page contains a personal handwritten note by the author: "To Igor Stravinsky, master and friend, affectionately, December 1957 Ernst Krenek." Stravinsky's penciled comments are preserved on the second page of the author's foreword. With subtly crossed out lines and arrows the composer explains to himself the technique of chromatic rotation based upon the example of the first hexachord of Krenek's series (Ex. 1).

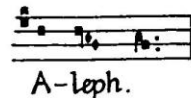
Der Text der *Lamentatio* besteht aus jenen Abschnitten der Klagelieder des Jeremias, die bei den katholischen Gottesdiensten am Gründonnerstag, Karfreitag und Karsamstag vorgetragen werden. Diese Abschnitte sind in je drei „Lektionen“ zusammengefaßt. Jede Lektion endet mit dem Anruf „Jerusalem, Jerusalem, convertere ad Dominum Deum tuum“. Diese refrainartige Zeile kommt also neunmal vor. Jede Lektion besteht aus mehreren Versen. Jeder Vers ist eingeleitet von einem Buchstaben des hebräischen Alphabets (Aleph, Beth, Ghimel etc.). Diese Buchstaben sind Bestandteile des Textes und werden gesungen so wie der Text selbst.

Organisation des musikalischen Materials

Die gregorianische Intonation der *Lamentatio* umfaßt die Töne F, G, A und B:



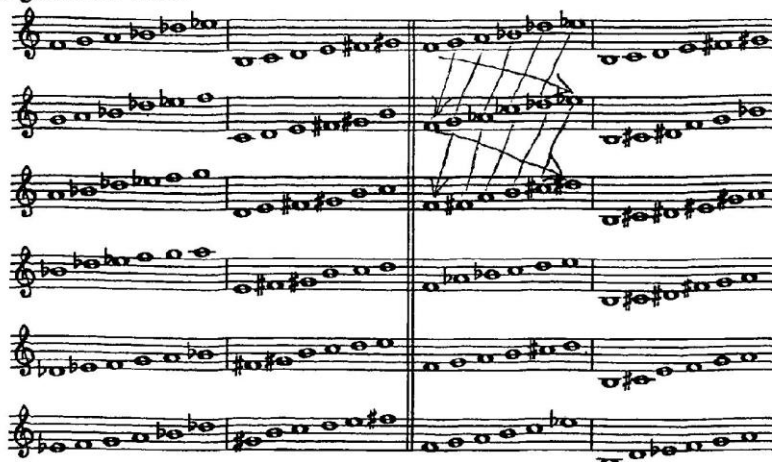
Alle Buchstaben werden auf das folgende Melisma gesungen:



Die vorliegende Komposition beruht auf einer Zwölftonreihe, die sich aus einer Erweiterung der gregorianischen Vierton-Gruppe ergibt:



Die beiden Hälften der Reihe, deren Anfangstöne eine halbe Oktave voneinander entfernt sind, werden gesondert behandelt. Von jeder der beiden Sechston-Gruppen werden je fünf weitere Gruppen abgeleitet, indem jeweils der dem ersten Ton der vorangehenden Gruppe folgende Ton zum Anfangston der nächsten Gruppe gemacht wird.



Jede der so gewonnenen Gruppenreihen enthält dieselben sechs Töne, doch liegen die Intervalle in bezug auf den Anfangston jedesmal an einer anderen Stelle. Die Anregung zu diesem „Rotationsverfahren“ gab mir das System der modalen Skalen des Mittelalters, das ein gleichbleibendes Material von sieben Tönen durch Verschiebung der Finalis in wechselnde Ordnungen bringt.

Der von manchen Musikhistorikern ausgesprochene Gedanke, daß die Griechen ihre auf ähnliche Weise gewonnenen „Oktav-Gattungen“ in den Bereich einer „charakteristischen“ Oktave zu transponieren pflegten, gab den Anstoß zu einer zweiten Form der Ableitung weiterer Gruppenreihen. Diese ergibt sich dadurch, daß die Reihen der linken Spalte von Beispiel 3 so transponiert werden, daß alle mit F beginnen. Die Reihen der rechten Spalte werden so transponiert, daß H zu ihrem Anfangston wird.

Ex. 1. Stravinsky's handwriting on the second page of Krenek's foreword

As the sketches testify¹, Stravinsky, beginning with *Movements*, derives musical ideas from serial forms, worked out in the manner of Krenek. In *Movements* the composer operates with musical material, borrowed from diatonic hexachordal-rotational squares O., I., R., I.R., as well as from the chromatic hexachordal-rotational squares O. Jumping ahead a bit, I can say that *Movements* is the only time Stravinsky used the diatonic means of rotation in his creative practice. Beginning with *A Sermon, a Narrative and a Prayer*, the composer solely resorts to chromatic rotation. In addition to the family of prioritized serial forms (O., I., R., I.R., R.I., R.I.R, I.R.I)², the musical texture of *A Sermon, a Narrative and a Prayer* instills in itself the "content" of chromatic hexachordal-rotational squares I. and R. (Ex. 2).

In *The Flood* and *Abraham and Isaac* the chromatic hexachordal-rotational elaboration is subjected to four serial forms – O., I., R., I.R.. The distinctive feature of serial organization in *Introitus* is that Stravinsky places a new type of tetrachordal rotation in its foundation. The Russian master began the composition of this small work with a drawing of the chromatic tetrachordal-rotational squares O., I., R., I.R. (Ex. 3)³.

In *Variations* Stravinsky takes still one more step along the path of discovering the potential expressive possibilities of rotation, subjecting the complete twelve-tone row to chromatic rotation. From the sketches of *Variations* it is clear that, besides the chromatic hexachordal-rotational squares O., R., I.R., Stravinsky also made use of chromatic dodecachordal-rotational half-squares, including six beginning interval modifications of O. (Ex. 4). In his final major composition – *Requiem Canticles* – the composer subjected the serial forms of both twelve-tone rows to chromatic hexachordal rotation.

The diverse methods of rotational development in the series of Stravinsky's late works demand, for convenience of analysis, an adequate system of designations. The system of designations presented by C. Spies is oriented on a search of analogies to hexachordal and dodecachordal chromatic-rotational models in a matrix of 48 serial rows. In an article devoted to *Abraham and Isaac*, C. Spies analyzes the chromatic hexachordal-rotational texture of the sacred ballad with the help of diatonic hexachordal-rotational squares, at the basis of which are the incorrectly determined O., I., R., R.I., and I.R. of this composition. The author designates the rotational origin of one or another element of the musical texture in the form of a four-elemental index, which includes the following: the first letter (or letters) of the Latin name of the serial form; the Greek letters α (the first hexachord) and β (second hexachord); the numbers from 1 to 11, indicating a possible interval of pitch displacement; and the numbers from 1 to 5 in the capacity of an ordinal number corresponding to the diatonic hexachordal-rotational model. Thus, for example, the index I. α 45 assumes a fourth diatonic rotational model, formed on the basis of the first hexachord of an inverse form, transposed onto a perfect fourth upwards [16, pp. 198-208]. For the chromatic dodecachordal-rotational fragments of *Variations*, C. Spies selected a somewhat different method of designation. Thus, the abbreviation R.-4 (10-9) indicates a retrograde, transposed on a major third upwards. The execution of this serial form was begun with its tenth, and completed with its ninth tone [17, pp. 214-220].

The image displays two systems of musical notation, each consisting of two columns of six staves. The first system is labeled with numbers 1 through 6 above the first column and 'R' above the second column. The second system is labeled with 'a' above the first column and 'β' above the second column. The notation includes notes, accidentals (sharps, flats, and naturals), and connecting lines between staves, illustrating hexachordal-rotational tables.

Ex. 2. The hexachordal-rotational tables of A Sermon, a Narrative and a Prayer

Introitus O

Introitus R

Introitus I

Introitus RI

Ex. 3. The tetrachordal-rotational tables of Introitus

O

R

I

RI

Ex. 4. The serial-rotational tables of Variations

N. Jers developed a more perfect system for designating serial-rotational material in Stravinsky's late twelve-tone compositions. One of the most obvious qualities of this system is its concise index differentiation for rotational methods. Based upon a system of terms, used in Krenek's foreword to *Lamentatio Jeremiae Prophetae*, N. Jers designates a diatonic method of rotation by the letter R, the first letter in the word "rotation". The chromatic method of rotation is noted by the German scholar with the help of the abbreviation RTr (rotation-transposition). The indices R and RTr are supplemented by the numbers from 1 to 5, indicating the ordinal number of the rotational model, and adjoins the letters G, U, K, KU, UK – the first letters of the German names of a series, inversion, retrograde, retrograde-inversion and inversion-retrograde, correspondingly. Thus, the abbreviation RTr_{1v}.G₁ indicates 1 rotation-transposition (the first chromatic rotational model), formed on the basis of the first hexachord of the series. Still one more indisputable virtue of Jers's system is the possibility of including in it the designation of verticals, formed by tones of chromatic hexachordal-rotational squares. For example, the abbreviation V_{1v}.U₂ indicates the first (if the beginning unison is discounted) vertical of the chromatic rotational square, based on the second hexachord of the inversion (6, pp. 2, 49-53). Although possessing incontrovertible qualities, Jers's system is not completely devoid of certain shortcomings. The main one is its inability to absorb the tetrachordal and dodecachordal variety of Stravinsky's rotational technique.

In an article devoted to a complex analysis of *Variations*, P. Phillips designates the hexachordal and dodecachordal variety of the chromatic rotation by the abbreviation t/r (transposition/rotation), introduced right after the Latin letter-index of serial form. The Greek letters α and β , inserted between them, testify to the use by Stravinsky of the hexachordal variety. The word "rank" and the Roman numerals from I to VI point to the rotated hexa- or dodecachord and any of its five chromatic models. Thus, for example, the index R- α t/r II designates the first rotational model of the first hexachord of a retrograde. Using the word "file" and Arabic numbers from 1 to 12, the scholar noted the vertical elements of the hexachordal squares and dodecachordal half-squares [14, pp. 70-84]. It is clear that the index system, used by P. Phillips, carries a local character, for it is closely connected with the specifics of the rotational process in *Variations*.

The latest attempt to create a serial-rotational index was made by J. N. Straus. In his study, dedicated to Stravinsky's late music, the scholar used too general three element structure: the letters P, I, P, IR to designate series forms; the letter A for their first hexachord and the letter B for their second hexachord; Roman numerals I, II, III, IV, V, VI to point the rows of rotational square [20, p.106].

In the index presented below I tried to design a universal type of designating all means of the twelve-tone rotational development, used by Stravinsky. The index consists of two blocks. The first block includes: as an obligatory element, the designation in Latin letters of one of four basic serial forms (O., I., R., I.R.); as a facultative element, the Arabic numbers from 1 to 11, indicating an interval of possible pitch transposition. For example, the abbreviation R.-3 indexes the retrograde form, transposed on a minor third upwards. I should note that the Arabic numbers as an indication of pitch dislocation designates the quantity of semitone steps, completed only in an ascending direction. Therefore the transport of a serial form, carried out, for example,

on a minor third downwards, will be designated with the help of the number 9, pointing to the necessary quantity of semitone steps upwards.

The second, properly rotational block is separated from the first block by a forward slash (O.-3/...). Its obligatory elements are a designation of the means of rotation (diatonic or chromatic), an indication of rotational variety (tetrachordal, hexachordal or dodecachordal), an ordinal number of the rotated row segment (in the cases of tetrachordal and hexachordal rotation), and an ordinal number of the horizontal components of the rotational square.

As it seems to me, the most convenient form of designating the means of rotation might be the capital Latin letters D and C—the first letters of the German words "diatonisch" and "chromatisch." We should remember that Krenek gave exactly such names to the methods of rotation in his foreword to *Lamentatio*. The form of rotation can be indexed with the aid of the Roman numerals IV, VI and XII, indicating the quantity of notes in the rotated serial formation. In Stravinsky's late works, rotated serial formation itself is designated in different ways. Thus, in the hexachordal-rotational tables of *Movements*, the composer noted the six-tone segments of the diatonic rotational squares O. and I. by the Greek letters α (1-6 tones) and β (7-12 tones). In the chromatic hexachordal-rotational squares O., two different Greek letters were used: γ for the first six-note segment and δ for the second (Ex. 5).

The serial-rotational tables of *A Sermon, a Narrative, and a Prayer* testify to Stravinsky's rejection of a previously chosen method of designation. The letter pairs α - β and γ - δ are used here not for differentiating methods of rotation, but for indexing the six-tone segments in the chromatic rotational squares I. (α for 1-6 tones, β for 7-12) and R. (γ for 1-6 tones and δ for 7-12) (Ex. 2). The dual method of designating hexachords is also preserved in the hexachordal-rotational tables of *The Flood* (α - β for hexachords O., R., I.R., γ - δ for hexachords I.) Subsequently, in order to designate six-note segments in the serial-rotational tables of *Abraham and Isaac, Variations* and *Requiem Canticles*, Stravinsky used only the lettered pair α - β . The composer made an exception only for the tetrachordal-rotational tables of *Introitus*. The four-note segments are designated here with the help of three Greek letters: α for 1-4 tones, β for 5-8 and γ for 9-12 (see Ex. 3). In contrast to the method of designating rotational segments, which underwent a lengthy evolution, the single principle of enumerating the horizontal elements of the rotational square Stravinsky worked out almost immediately. In the hexachordal-rotational tables of *Movements* the composer noted the rotational models of hexachordal squares with Roman numerals from I to V (Ex. 5). However, already in *A Sermon, a Narrative and a Prayer*, Stravinsky changed the principle of numeration, making it consistent. Here the Arabic numbers 2-6 designate the chromatic models of α hexachords in the rotational squares I. and R. (Ex.2). For the first time the composer used the number 1 for the hexachords themselves in the serial-rotational tables of *The Flood* (Ex. 6).

As it seems to me, this method of numeration may be disseminated on all types of rotational squares in Stravinsky's late works. Depending upon the dimensions of the initial segment, the horizontal components of the tetrachordal-rotational square can be enumerated by the numbers 1 to 4, the horizontal components of the hexachordal-rotational square and the dodecachordal-rotational half-square – by the numbers 1 to 6.

1 2 3 4 5 6

a β γ δ

I II III IV V

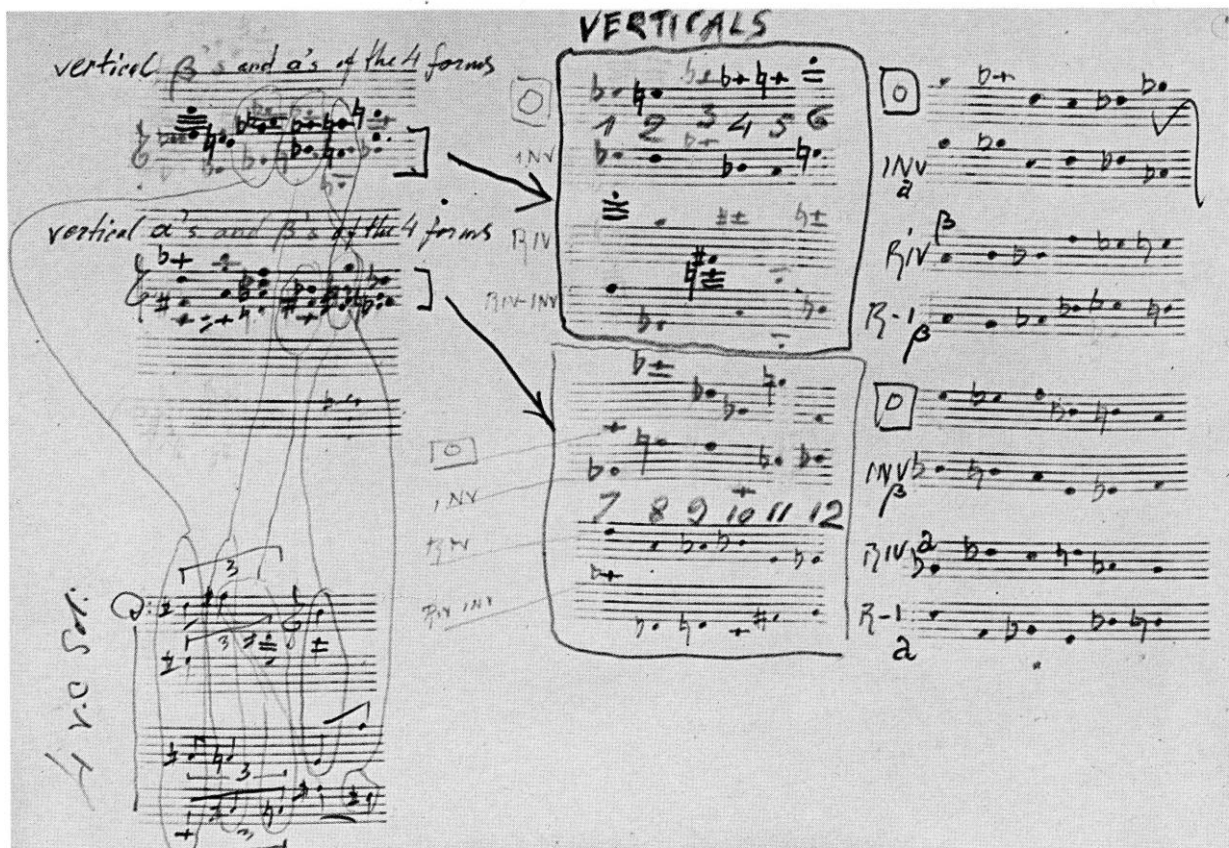
Inv. a β

I II III IV V

Ex. 5. The hexachordal-rotational tables of Movements

Ex. 6. The hexachordal-rotational tables of *The Flood*

Besides the four parts noted above, indicating the means of rotation, its variety, its segmented foundation with a designation of the ordinal number of the horizontals from the rotational square, the rotational block can also include the following: the first letter of the word "verticals," with the help of which Stravinsky, beginning with *A Sermon, a Narrative and a Prayer*, noted in the sketches the vertical elements of the hexachordal-rotational squares (Ex. 7); the first letter of the word "horizontal," designating in *The Flood* the chord verticals, formed from the tones of horizontal elements of hexachordal-rotational squares; a shortened variant of the word "cancricans" (canc.), as an indication of the retrograde form of one or another element of the rotational musical texture; and small numbers in parentheses, designating separate notes from any element of the rotational square.



Ex. 7. A page from working text for *Abraham and Isaac*

Thus, for example, the index I./D.VI.β2(4-6) indicates the last three notes of the second horizontal, belonging to the second (7-12 tones) diatonic hexachordal-rotational square of an inverse series form. The index O./C.IV.γV3 is deciphered as the third vertical, formed by the four tones of the third chromatically rotated tetra-chord O. The index I.R./C.VI.αH4 is pointing to the chord, assembled from the notes of the fourth horizontal, coming from the first (1-6 tones) chromatic hexachordal-rotational square of a retrograde-inversion form. As can be observed, the principles of enumerating horizontal and vertical components of rotational squares are identical.

The practical use of the index, described in this article, allows, as it becomes obvious from the 4th, 6th and 7th chapters of my study "Late Works of I.F. Stravinsky" [4, p.p. 48-80, 118-159], in a concise and clear form to analyze the extremely complex process of serial-rotational development in Stravinsky's seven major late works after *Threni*.

Notes

¹ Working on an article I used the already published, as well as my own handwritten copies of the sketches from the Stravinsky Archive in the Paul Sacher Foundation.

² More detailed information about the family of prioritized serial forms can be found in (4, p.p. 41-42).

³ In sketches Stravinsky designates an inversion of retrograde (I.R.) as RI.

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