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An Explanation of Anomalous Hexachords in Four Serial Works by Igor Stravinsky

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I am submitting herewith a thesis written by Robert Sivy entitled "An Explanation of Anomalous Hexachords in Four Serial Works by Igor Stravinsky." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Music, with a major in Music.

Brendan P. McConville, Major Professor

We have read this thesis and recommend its acceptance:

Barbara Murphy, Donald Pederson

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**An Explanation of Anomalous Hexachords
in Four Serial Works by Igor Stravinsky**

A Thesis Presented for the
Master of Music
Degree
The University of Tennessee, Knoxville

Robert Jacob Sivy
August 2011

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To my wife, Katherine and our son, Michael.

ABSTRACT

Igor Stravinsky's precompositional process was so methodical that his move to serialism is no surprise. After becoming acquainted with the music of Schoenberg and Webern, Stravinsky was moved to experiment with serial techniques. He rejected many of the conventional approaches developed by the serial architects, only to adopt the technique at its basic form—the use of a series of pitches—and cultivate it into his own compositional style. Stravinsky continued to refine his style throughout his serial period (1951–1966) as each composition grew increasingly more serial than the last. For each work composed after 1960, Stravinsky constructed rotation arrays, a serial technique he adopted from Ernst Krenek. These arrays consisted of a twelve-tone row partitioned into hexachords, with each hexachord rotated to create five additional permutations per hexachord. These permutations were then transposed so that the first pitch of the original hexachord was retained for each permutation. This operation was performed on four series forms: prime, inversion, retrograde, and inversion of the retrograde (favored by Stravinsky over the traditional retrograde inversion form). It is from his rotational arrays that Stravinsky systematically chose hexachords to compose *A Sermon, a Narrative, and a Prayer* (1961); *The Flood* (1962); *Abraham and Isaac* (1963); and *Requiem Canticles* (1966). Though his precompositional charts are very specific in determining pitch application, it is difficult to account for the use of some hexachords that are found in these works but not found in Stravinsky's charts, as the hexachords do not explicitly appear in the charts. Many analysts have glossed over these incongruities. For instance, Joseph Straus mentions very little about these “anomalous hexachords” in *Stravinsky's Late Music* (2001); and Claudio Spies completely ignores the hexachords in question. In

this paper I will identify these anomalous hexachords and attempt to explain their derivation from Stravinsky's charts.

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CHAPTER I SERIAL BEGINNINGS

Introduction

In *Stravinsky's Late Music*, Joseph Straus states that the "vast melodic expanse of [Igor Stravinsky's] *A Sermon, a Narrative, and a Prayer; The Flood; Abraham and Isaac; and Requiem Canticles* arise from the systematic cycles through his rotational arrays."¹ Stravinsky used two methods of systematic cycling through his arrays: (1) weaving from one hexachord to the next by connecting each hexachord by one or more invariant pitches; and (2) moving from array to array by way of invariant hexachords. In both cases, hexachords are read horizontally, from left to right, or right to left. Stravinsky also sought harmonic content from the rotational arrays by employing what he called "verticals," which are hexachords that are identified by a top-to-bottom reading of his arrays. Straus' comment concerning melodic content prompted me to trace and compare the hexachords employed in the above mentioned works to the arrays of Stravinsky's charts; in my analysis I have discovered hexachords that are absent from the his charts. This poses a question concerning Stravinsky's serial composition: are these anomalous hexachords mistakes? In the scholarly writings examined, particularly analyses by Claudio Spies, Anthony Payne, Thomas Clifton, and Joseph Straus, the hexachords in question are either insufficiently explained or ignored.² In this paper, I will identify the anomalous hexachords—that is, those hexachords that cannot be found in the conventional horizontal or vertical reading of Stravinsky's charts³—in *A Sermon, a Narrative, and a Prayer; The Flood; Abraham and*

¹ Joseph Straus, *Stravinsky's Late Music*, (New York: Cambridge University Press, 2001), 106.

² These scholars have written extensively on Stravinsky's works based on his hexachordal rotational arrays.

³ Pieter van den Toorn, *The Music of Igor Stravinsky*, (New Haven: Yale University Press, 1983), 432. Van den Toorn summarizes the typical reading and implementation of hexachords of Stravinsky's rotation charts: "Delineation of these hexachordal rotations may be unpatterned, or, more characteristically, patterned in one of two

Isaac; and *Requiem Canticles* and postulate their existence through text painting. The charts used in my analysis were constructed from Stravinsky's prime ordering of the rows that were available to me in a number of sources.⁴

Stravinsky's Serial Process

During the 1950s, Igor Stravinsky, aware of the low esteem for his music held by younger composers, reached a turning point in his compositional style. Stravinsky, perhaps a bit envious of the wide recognition of the music of serial composers, felt an overwhelming pressure to experiment with serial techniques. Robert Craft recounts the episode where Stravinsky arrived at this realization:

We drove to Palmdale for lunch, spareribs in a cowboy-style restaurant, Bordeaux from I. S.'s [Igor Stravinsky's] thermos. A powdering of snow is in the air, and, at higher altitudes, on the ground. Angelenos stop their cars and go out to touch it. During the return, I. S. startles us, saying he fears he can no longer compose; for a moment he actually seems ready to weep. Vera [Stravinsky] gently, expertly, assures him that whatever the difficulties, they will soon pass. He refers obliquely to the Schoenberg

ways: either the music proceeds up or down a hexachordal ladder, reading from right to left or from left to right (or, less systematically, through a combination of these readings; or it proceeds up or down a hexachordal ladder by means of a spiral or zigzag course, alternating with each successive rotation between a right-to-left and a left-to-right reading.”

⁴ All prime row forms for the works studied in this paper are confirmed in Straus' *Stravinsky's Late Music*. Numerous sources that were consulted to explore other row possibilities include the following: Timothy J. Buell, "The Harmonic Language of Stravinsky's *Abraham and Isaac*," *Ex Tempore* 5, no. 1 (1989), 43–76; Thomas Clifton, "Types of Symmetrical Relations in Stravinsky's *A Sermon, a Narrative, and a Prayer*," *Perspective of New Music* 9, no.1 (1970), 96–112; Roberto Gerhard, "Twelve-Note Technique in Stravinsky," *The Score* 20 (1957), 38–43; Anthony Payne, "Stravinsky's *The Flood*," *Tempo* 70 (1964), 2–8; "Two New Stravinsky Works: *Abraham and Isaac* and *Elegy for J. F. K.*," *Tempo* 73 (1965), 12–15; "Stravinsky's *Requiem Canticles*," *Tempo* 81 (1967), 10–18; Claudio Spies, "Some Notes on Stravinsky's *Abraham and Isaac*," *Perspectives of New Music* 3, no. 2 (1965), 104–126; Pieter van den Toorn, *The Music of Igor Stravinsky*, (New Haven: Yale University Press, 1983); Roman Vlad, *Stravinsky*, (New York: Oxford University Press, 1978); and Eric Walter White, *Stravinsky: The Composer and His Works*, (London: Faber and Faber, 1979).

Septet and the powerful impression it has made on him. After 40 years of dismissing Schoenberg as “experimental,” “theoretical,” “démodé,” he is suffering the shock of recognition that Schoenberg’s music is richer in substance than his own.⁵

Spurred by the realization of his compositional dilemma in the early 1950s, Stravinsky began to experiment and employ some forms of serial techniques in his compositions. The output of Stravinsky’s works between 1952 and 1966 exemplifies tremendous growth as a serial composer. Joseph Straus (*Stravinsky's Late Music*) catalogues Stravinsky’s serial works as a “succession of firsts”: *Cantata* (1952), *Septet* (1953), *Three Songs from William Shakespeare* (1954) – his first works to employ a series; *In Memoriam Dylan Thomas* (1954) – his first fully serial work; *Agon* (1954-57) – his first work to use a twelve-tone series; “Surge, aquilo,” from *Canticum Sacrum* (1956) – his first work to include a complete twelve-tone movement; *Threni* (1958) – his first completely twelve-tone work; *Movements for Piano and Orchestra* (1959) – his first work to use twelve-tone arrays based on hexachordal rotation; *A Sermon, a Narrative, and a Prayer* (1961) – his first work to use verticals of the rotational arrays; *Variations* (1965) – his first work to rotate the twelve-tone series; *Introitus* (1965) – his first work to rotate the tetrachords of the twelve-tone series; and *Requiem Canticles* (1966) – his first work to use two different series.⁶

For all works from *Movements* on Stravinsky employed the serial operation of hexachordal rotation, a procedure developed by the contemporary composer/theorist Ernst Krenek and first employed in Krenek's *Lamentatio Jeremiae Prophetiae* (1941, published in

⁵ Robert Craft, *Stravinsky: Chronicle of a Friendship 1948 –1971*, (New York: Knopf, 1972).

⁶ Straus, 4.

1957).⁷ This operation involves partitioning a twelve-tone series into hexachords (labeled α [alpha] and β [beta])⁸ and then rotating each hexachord by moving the first pitch to the end until five additional permutations are created (Figure 1). To create commonality among hexachords, these two arrays of rotated hexachords are then transposed in order to retain the original first pitches of the hexachords (labeled γ [gamma] and δ [delta]). This rotational technique was introduced to Stravinsky in the summer of 1959 while he attended the Princeton Seminar in Advanced Musical Studies. At the seminar Krenek lectured on his technique of hexachordal rotation and its use in his *Lamentatio Jeremiae Prophetarum*.⁹ In a brief letter to Robert Craft on 2 January 1981, Krenek wrote:

I have known Stravinsky since 1924 when I visited him in Nice, but I knew him more intimately only after the war in this country [USA] when he had turned toward the twelve-tone technique. I saw him relatively frequently when we visited mutually. I know that he rather thoroughly studied my *Lamentatio Jeremiae Prophetarum*...when he worked on *Threni*.¹⁰

In his *Dialogues*, Stravinsky briefly acknowledges his indebtedness to Krenek's *Lamentatio* and *Studies in Counterpoint Based on the Twelve-Tone Technique* (1940).¹¹ *Studies*

⁷ Robert Craft comments: "At the age of seventy, [Stravinsky] was deeply influenced by Krenek's *Studies in Counterpoint* [a guide to twelve-tone composition]." *Stravinsky: Glimpses of a Life*, (New York: St. Martin's Press, 1992), 285.

⁸ These Greek symbols have become conventional analytical symbols. See David Carson Berry, *Stravinsky's Skeletons: Reconnoitering the Evolutionary Paths from Variation Sets to Serialism*, (PhD diss., Yale University, 2002); Claudio Spies, "Some Notes on Stravinsky's Requiem Settings," *Perspectives of New Music* 5, no. 2 (Spring-Summer 1967): 98–123; and Joseph Straus, *Stravinsky's Late Music*, (New York: Cambridge University Press, 2001).

⁹ Krenek's lecture was later published as "Extents and Limits of Serial Technique" in *The Musical Quarterly*, 46, no. 2 (April, 1960), 211–212.

¹⁰ Quoted in Clare Hogan, "Threni: Stravinsky's 'Debt' to Krenek," *Tempo* 141 (1982), 23.

¹¹ Igor Stravinsky and Robert Craft, *Dialogues*, (Berkeley: University of California Press, 1982), 103.

α								β						
	E \flat	E	B \flat	A \flat	A	D		C	B	C \sharp	F \sharp	G	F	
I	E	B \flat	A \flat	A	D	E \flat		B	C \sharp	F \sharp	G	F	C	
II	B \flat	A \flat	A	D	E \flat	E		C \sharp	F \sharp	G	F	C	B	
III	A \flat	A	D	E \flat	E	B \flat		F \sharp	G	F	C	B	C \sharp	
IV	A	D	E \flat	E	B \flat	A \flat		G	F	C	B	C \sharp	F \sharp	
V	D	E \flat	E	B \flat	A \flat	A		F	C	B	C \sharp	F \sharp	G	
	γ							δ						
	E \flat	E	B \flat	A \flat	A	D		C	B	C \sharp	F \sharp	G	F	
I	E \flat	A	G	A \flat	D \flat	D		C	D	G	A \flat	G \flat	D \flat	
II	E \flat	D \flat	D	G	A \flat	A		C	F	G \flat	F \flat	C \flat	B \flat	
III	E \flat	E	A	B \flat	B	F		C	D \flat	C \flat	G \flat	F	G	
IV	E \flat	A \flat	A	B \flat	E	D		C	B \flat	F	F \flat	G \flat	C \flat	
V	E \flat	E	F	B	A	B \flat		C	G	G \flat	A \flat	D \flat	D	

Figure 1. Rotational array of the prime form of the row for *Movements*

in Counterpoint, which provided Stravinsky with the basic principles of twelve-tone composition, was the first book he ever read on the subject.¹² Krenek's use of hexachordal rotational charts for the composition of his *Lamentatio* provided Stravinsky with what would become “the most distinctive and characteristic structure” of all his serial works. The impact of Krenek's *Lamentatio* also inspired Stravinsky to compose his own setting of texts from the Lamentations of Jeremiah.¹³

For each work after and including *Movements* Stravinsky performed hexachordal rotation and transpositional rotation on four forms of the row: prime (P), inversion (I), retrograde (R), and inversion of the retrograde (IR).¹⁴ Given the considerable influence Krenek had on Stravinsky, it is possible that Stravinsky adopted the use of the IR form from Krenek's *Studies in Counterpoint* as opposed to the more commonly used retrograde inversion (RI) form. The IR form, being inversionally related to the

¹² Ibid.

¹³ Straus, 32.

¹⁴ Hogan, 22 – 25; and Straus, 28.

retrograde form, is a transposition of the RI form, as the interval series is exactly the same (Figure 2). A complete chart of hexachordal rotational arrays provided Stravinsky with sixteen arrays, each containing five permutations in addition to the original hexachord, which he chose to work systematically throughout his compositions.¹⁵ For clarity Stravinsky's Greek labeling of the arrays has been retained in this analysis. Each hexachord permutation is labeled with ascending Roman numerals (added by this author).

P	E \flat	E	B \flat	A \flat	A	D	C	B	C \sharp	F \sharp	G	F
I	E \flat	D	A \flat	B \flat	A	E	F \sharp	G	F	C	B	C \sharp
R	F	G	F \sharp	C \sharp	B	C	D	A	A \flat	B \flat	E	E \flat
RI	C \sharp	B	C	F	G	F \sharp	E	A	B \flat	A \flat	D	E
Intervals	<10	1	5	2	11	10	5	1	10	6	1> ¹⁶	
IR	F	E \flat	E	A	B	B \flat	A \flat	C \sharp	D	C	F \sharp	G
Intervals	<10	1	5	2	11	10	5	1	10	6	1>	

Figure 2. Comparison of RI and IR row forms used in *Movements*

¹⁵ See appendix for complete charts of the four works discussed.

¹⁶ Angle brackets are used throughout this paper to denote the interval series of sets. See Miguel A. Roig-Francolí, *Understanding Post-Tonal Music*, (Boston: McGraw-Hill, 2008), 77.

CHAPTER II A SERMON, A NARRATIVE, AND A PRAYER

A Sermon, a Narrative, and a Prayer is a cantata written in 1961 for alto and tenor soli, speaker, chorus, and orchestra, and was commissioned by Paul Sacher. Sacher premiered the work with the Basler Kammerorchester in Basel, Switzerland in February 1962. The orchestra is used sparingly; the full ensemble is never heard all together. In the score, instruments are unconventionally grouped according to pitch and timbre. The text is taken from Romans 8:24 and Hebrews 11:1 and 12:29 (Sermon)¹⁷; the martyrdom of Stephen from Acts chapter 6 (Narrative); and a verse by Thomas Dekker (spelled Dekkar in the score) headed ‘In memoriam the Reverend James McLane (†1960)’ (Prayer).¹⁸ Stravinsky considered *A Sermon, a Narrative, and a Prayer* to be the New Testament equivalent to his *Threni*.¹⁹ In a note to Paul Sacher written in August 1961, Stravinsky explained that as *Threni* went back to the Old Testament for its text, so *A Sermon, a Narrative, and a Prayer* was a cantata of the New Testament. Indeed, some of the techniques used in *Threni* were retained for *A Sermon, a Narrative, and a Prayer* (i.e. twelve-tone music and the use of canons).

The form of *A Sermon...* resembles that of Bach's *Passions* in which the central theme of salvation found in the story of the martyrdom of St. Stephen (the narrative) is framed by an expression of faith (the sermon) and praise through prayer (the prayer).²⁰ For the purpose of this analysis, explaining anomalous hexachords, only the first movement, *A Sermon*, will be the area of focus. This movement is in two large sections that are each broken into four smaller sections

¹⁷ Robert Copeland, “The Christian Message of Igor Stravinsky,” *The Musical Quarterly* 68, no. 4 (1982), 575.

¹⁸ Colin Mason, “Stravinsky’s New Work,” *Tempo* 59 (1961), 14.

¹⁹ Stephen Walsh, *The Music of Igor Stravinsky*, (London: Routledge, 1988), 256.

²⁰ *Ibid.*

(Table 1). Throughout the movement the vocal soloists alternate with the chorus while the orchestra accompanies, though its instruments are never used all at the same time.

The entire work is constructed from the rotational arrays based on all four forms of the twelve-tone series (see appendix for complete chart):²¹

P:	D#	E	C	D	C#	A#	B	F#	G	A	G#	F
I:	D#	D	F#	E	F	G#	G	C	B	A	A#	C#
R:	F	G#	A	G	F#	B	A#	C#	D	C	E	D#
IR:	F	D	C	D#	E	B	C	A	G#	A#	F#	G

Stravinsky's implementation of the hexachords of his arrays in *A Sermon, a Narrative, and a Prayer* are indeed varied; however, one prominent application of hexachords is through their contrapuntal blending among the chorus voices. An example of this is seen Figure 3. In measure 12 the pitches of the $R\gamma_{I\bar{r}}$ [D, G#, D#, E, F#, F] and $R\gamma_{II\bar{r}}$ [E, C#, G, D, D#, F] hexachords are distributed between the sopranos and altos.²² On beats one and two the sopranos sing the first dyad of $R\gamma_{I\bar{r}}$, while the altos sing the first dyad of $R\gamma_{II\bar{r}}$. Both voices sing the second dyads of the opposing hexachords on beats three and four. The voices exchange again to sing the fifth pitches of each hexachord. The tenors and basses then sing the final pitch of both $R\gamma_{I\bar{r}}$ and $R\gamma_{II\bar{r}}$ hexachords, which share the same final pitch, F. This invariant pitch also starts the next set of hexachords, $R\gamma_{II}$ [F, D#, D, G, C#, E] and $R\gamma_{III}$ [F, D#, D, G, C#, E]), whose pitches are similarly distributed between tenors and basses. The connection of hexachords through invariant pitch is largely the source for the success of Stravinsky's works in which rotation, particularly transposed rotation, is employed. Stravinsky's meticulous compositional systemization is followed in this movement by faithfully keeping to his charts.

However, in my analysis I have found two sections in the first movement that both

²¹ Eric Walter White, *Stravinsky: The Composer and His Works*, 2nd edition, (London: Faber and Faber, 1979), 511.

²² A retrograde reading of the hexachord is indicated by *r*.

Table 1. Formal structure of the first movement of *A Sermon, a Narrative, and a Prayer*

Large Sections	A				A'			
Small Sections	Prelude	a	b	c	Interlude	a'	b	c
Measures	1 – 11	12 – 26	27 – 30	31 – 34	35 – 44	45 – 63	64 – 67	68 – 71
Row/Hexachord Orientation	P and R	R γ and R δ	R and IR	IR γ and R γ	P and R	R δ and R γ	R and IR	IR γ and R γ
Text	[Instrumental]	We are saved by hope, but hope that is seen is not hope, for what a man sees why does he yet hope for?	The substance of things hoped for, the evidence of things not seen, is faith.	And our Lord is a consuming fire.	[Instrumental]	If we hope for what we see not, then do we with patience wait for it.	The substance of things hoped for, the evidence of things not seen, is faith.	And our Lord is a consuming fire.

The image displays a musical score for the vocal parts of 'A Sermon' by Igor Stravinsky. The score is divided into two systems, labeled 'S.' and 'A.' on the right. The vocal parts are Soprani, Alti, Tenori div., and Bassi div., all in 4/8 time. The lyrics are 'We are saved by hope, we are saved by hope, by hope, hope'. The score includes various musical notations such as dynamics (*mf*, *sub. p*), articulation (*mf*), and phrasing (*s*). Annotations in boxes and circles identify specific rhythmic motifs: R7Ir (circled), R7IIIr (boxed), R7II (circled), R7IVr (boxed), R7IIIr (circled), R7IV (boxed), and R7V (circled). Arrows connect these motifs across different vocal parts, showing their recurrence and variation. A box with the number '15' is present in the Soprani part of the first system.

Figure 3. A Sermon mm. 12–19
 A Sermon, a Narrative, and a Prayer by Igor Stravinsky
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contain sequences of hexachords that are incongruous with Stravinsky's chart. These two anomalies occur in measures 21–23 and 54–63. By understanding Stravinsky's method of contrapuntal weaving of hexachords between voices, the identification of hexachords within these sections is somewhat simplified. The task becomes easier when hexachords are recognized by intervallic structure, rather than pitch. In fact, Stravinsky often commented on the importance of composing "according to certain interval-relationships" rather than according to pitch.²³ For the first anomaly, the sequence of hexachords found in measures 21–23 is outlined in Figure 4.

Measures:

21–22 AH 1 [B, C, Bb, D, C#, G#] <1, 10, 4, 11, 7, (3)>	22–23 AH 3 [Eb, Db, F, E, B, D] <10, 4, 11, 7, 3, (1)>	23 R δ_{III} [Bb, D, Db, Ab, B, C] <4, 11, 7, 3, 1, (10)>
AH 2 [B, Eb, D, A, C, C#] <4, 11, 7, 3, 1, (10)>	AH 4 [Eb, D, A, C, Db, B] <11, 7, 3, 1, 10, (4)>	R δ_{III} [Bb, F, Ab, A, G, B] <7, 3, 1, 10, 4, (11)>

**Figure 4. Sequence of hexachords with interval series, mm. 21–23 of *A Sermon*
(Anomalous hexachords are annotated AH)**

The interval series for each of the hexachords in this sequence displays a striking resemblance to the interval series of the original Rδ hexachord, <3, 1, 10, 4, 11, (7)>. It appears that Stravinsky sought to retain the intervallic space of the Rδ hexachord. But, if the melodic content of Stravinsky's serial works is to be traced through his own charts of rotational arrays, as Straus suggests, then the question remains: how are these

²³ Igor Stravinsky, *Poetics of Music in the form of Six Lessons*, (Cambridge: Harvard University Press, 1970), 34.

hexachords, which are *not* found on the charts, justified? Upon close examination, it appears that the composer did, in fact, use hexachords that *do* appear in the charts, albeit not conventionally—that is, neither horizontally (left to right, or right to left), nor vertically. AH 1, [B, C, Bb, D, C#, G#], contains the same pitch classes and a similar order as $R\delta_{III}[A\#, D, C\#, G\#, B, C]$. Because of the similar ordering of pitches, it appears Stravinsky performed a second operation of rotation on this hexachord. "Double rotation" will be labeled τ_n , where Greek letter τ (tau) indicates the second operation of rotation and the subscript n indicates the point within the hexachord at which the second rotation occurs.²⁴ For example, the hexachord $R\delta_{III}[A\#, D, C\#, G\#, B, C]$, rotated to the fourth pitch, B, produces [B, C, Bb, D, C#, G#], the pitch series of AH 1, and would then be labeled $R\delta_{III}\tau_4$. Note that the first pitch of the original hexachord need not be counted since there is no possible rotation on it. With this system of labeling established, the sequence of hexachords in measures 21–23 and their relationship to one another is less ambiguous (Figure 5).

A double rotation may seem superfluous, but the explanation for Stravinsky's use of it may lie within the text to which the questionable hexachords are set. Taken from the eighth chapter of Paul's letter to the Romans, the text reads, "We are saved by hope, but hope that is seen is not hope, for what a man sees why does he yet hope for?" The anomalous hexachords are set to the text "but hope that is seen is not hope." There is an explicit connection between the hope, or faith, that cannot be seen and the anomalous hexachords that are not seen in the chart. This is not the first instance where Stravinsky

²⁴ In physics, τ is used to express torque, or the tendency of a force to rotate an object about its axis. Given the similarities between torque and hexachordal rotation I have borrowed the Greek letter τ to express this second operation of rotation.

Measures:

21–22

$R\delta_{III}\tau_4$ [B, C, Bb, D, C#, G#]

22–23

$P\gamma_{III}\tau_5$ [Eb, Db, F, E, B, D]

23

$R\delta_{III}$ [Bb, D, Db, Ab, B, C]

$P\gamma_{I}\tau_4$ [B, Eb, D, A, C, C#]

$P\gamma_{I}\tau_5$ [Eb, D, A, C, Db, B]

$R\delta_V$ [Bb, F, Ab, A, G, B]

The image shows a musical score for four vocal parts: Soprano (S.), Alto (A.), Tenor (T.), and Bass (B.). The lyrics are: "but hope that is seen is not hope". The score includes several annotations:

- Soprano (S.):** Labeled with $P\gamma_{III}\tau_5$ in a box. A circled $P\gamma_{I}\tau_5$ is also present. The notes "seen is not hope" are circled.
- Alto (A.):** Labeled with $P\gamma_{I}\tau_5$ in a box. The notes "seen is not hope" are circled.
- Tenor (T.):** Labeled with $R\delta_{III}\tau_4$ in a box. The notes "that is seen is not hope" are circled. A circled $R\delta_{III}$ is also present.
- Bass (B.):** Labeled with $P\gamma_{I}\tau_4$ in a box. The notes "that is seen is not hope" are circled. A circled $R\delta_V$ is also present.

 Arrows indicate relationships between these annotations across the different parts. The score is in 5/8 time and features triplets and other rhythmic markings.

Figure 5. Revised terminology for the sequence of twice-rotated hexachords in mm. 21–23 of *A Sermon*

painted text within a serial composition. The first movement, “Musik to hear,” from his *Three Songs from William Shakespeare* is based on transpositions of prime and retrograde orderings on the four-note series [B, G, A, Bb]. In the second measure of

rehearsal five, the two middle pitches of the tetrachord are reversed on the text “do offend thine eare” (Figure 6).²⁵



Figure 6. “Musik to heare” rehearsal 5, from *Three Songs from William Shakespeare*

Three Songs from William Shakespeare by Igor Stravinsky
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The second example of anomalous hexachords in *A Sermon* appears in measures 53–63 (this sequence is outlined in Figure 7). The hexachords are set to the text “then do we with patience wait for it” that refers to the pervading theme of hope, which cannot be seen. Like the previous section of anomalies, these hexachords may be accounted for by way of double rotation. The recurrence of a sequence of twice-rotated hexachords is logical given the overall formal design (Figure 3). As in the first *a* section, the hexachords in measures 53–63 (section *a'*) are distributed through contrapuntal blending between the voices of the choir; however, the *a'* section is more expanded to accommodate the multiple syllables of the new text. The intervallic structures of the

²⁵ Joseph Straus, “Stravinsky’s Serial Mistakes,” *The Journal of Musicology* 17, no. 2 (1999), 259–260.

Measures:

53–55

AH 1 [C#, G#, A, B, Bb, G]
<7, 1, 2, 11, 9, (6)>

55–56

AH 3 [Gb, Fb, Eb, Ab, D, F]
<10, 11, 5, 6, 3, (1)>

57–58

R γ _{IVr} [Gb, Ab, G, E, Bb, F]
<2, 11, 9, 6, 7, (1)>

AH 2 [E, Bb, F, F#, Ab, G]
<6, 7, 1, 2, 11, (9)>

AH 4 [Gb, F, Bb, E, G, Ab]
<11, 5, 6, 3, 1, (10)>

R γ _{Vr} [C, Db, Eb, D, B, F]
<1, 2, 11, 9, 6, (7)>

60–61

AH 5 [C#, D, Bb, C, Cb, Ab]
<1, 8, 2, 11, 9, (5)>

62–63

AH 6 [A, E, F, G, F#, Eb]
<7, 1, 2, 11, 9, (6)>

Figure 7. Sequence of hexachords with interval series, mm. 53–63 of *A Sermon*

hexachords of measures 53–58 are similar to the interval series of P δ , <7, 1, 2, 11, 9, (6)>, and R γ , <3, 1, 10, 11, 5, (6)>. Stravinsky appears to be expanding his previous musical ideas presented in the *a* section by blending two hexachord types, P δ and R γ , which is only one hexachord combined with its retrograde form (Figure 8).

$$P\delta [B, F\#, G, A, G\#, F] \xrightarrow{\mathbf{R}} R\gamma [F, G\#, A, G, F\#, B]$$

Figure 8. The retrograde of P δ is R γ

Measures 59–63 of *A Sermon* feature tenor and bass soloists and repeat the text "then do we with patience wait for it" by singing through doubly-rotated hexachords of the R form of the row. Perhaps, because the text is restated, Stravinsky found it necessary to continue to use doubly-rotated hexachords. The sequence of doubly-rotated hexachords used in measure 53–63 is outlined in Figure 9.

S. *tranquillo*
then do we with

CORO

A. *tranquillo*
unls.
then do we with pa - tience,

S. div. pa - tience ... for it

A. *tranquillo*
unls.
with pa - tience wait for it

CORO

T. *tranquillo*
unls.
with pa - tience for it

B. *tranquillo*
with pa - tience wait

TENORE SOLO

T. then do we wait for it

BASSO SOLO
voce del coro

B. then do we with pa - tience wait

Figure 9. Revised terminology for *A Sermon* mm. 53–63²⁶

(continued)

²⁶ Straus has corrected the C in the tenor line of measure 56 (marked in Figure 9 with an asterisk) to D. This is complicit with the Ry array. “Stravinsky’s Serial Mistake,” 263.

(Figure 9 concluded)

Measures:

53–55

P $\delta_{III}\tau_3$ [C#, G#, A, B, Bb G]

55–56

R $\gamma_{I\tau_1}$ [Gb, Fb, Eb, Ab, D, F]

57–58

R γ_{IVr} [Gb, Ab, G, E, Bb, F]

R $\gamma_{IVr\tau_3}$ [E, Bb, F, F#, Ab, G]

R $\gamma_{IV\tau_5}$ [G, F, Bb, E, G, Ab]

R γ_{Vr} [C, Db, Eb, D, B, F]

60 – 61

R $\delta_{IIIr\tau_3}$ [C#, D, Bb, C, Cb, Ab]

62 – 63

R $\gamma_{IIIr\tau_3}$ [A, E, F, G, F#, Eb]

CHAPTER III THE FLOOD

The Flood, completed in 1962, is a musical play scored by Stravinsky and choreographed by George Balanchine. Commissioned by the Columbia Broadcast System (CBS), the play was premiered on the television network in a special telecast on June 14, 1962. According to the Nielsen ratings four million homes tuned in, but, perhaps thrown by the culmination of several oddities (i.e. alien-like costumes, modern dance, and serial music) and frequent commercial breaks by Breck's Shampoo sponsors, the public tuned out leaving only one million viewing homes at the end of the telecast.²⁷

The Flood retells the story from the book of Genesis of man's fall to sin and his redemption through Noah and the flood. Although Stravinsky called *The Flood* a musical play, the work is a collage of opera, ballet, narration, and pantomime.²⁸ The texts were taken from the book of Genesis and the York and Chester Miracle plays of the 15th century and were compiled by Robert Craft.²⁹ *The Flood* is scored for large orchestra, tenor soloist, bass duet, SAT chorus, narrator, and speakers and is divided into six sections (Table 2).

The prime form of the series Stravinsky used in *The Flood* is [C#, B, C, F#, D#, F, E, D, Bb, A, G, G#].³⁰ In addition to the four row forms typically used by Stravinsky in *The Flood*, he employs two additional forms: the retrograde inversion (RI) and the

²⁷ Charles M. Joseph, *Stravinsky Inside Out*, (New Haven: Yale University Press, 2001), 135.

²⁸ Francis Routh, *Stravinsky*, (London: J. M. Deent & Sons, 1975), 62.

²⁹ Joseph, 150.

³⁰ Straus, *Stravinsky's Late Music*, 149.

Table 2. Formal outline of *The Flood*

Section	Measures	Instrumentation	Row/Hexachord Used
I. Prelude	1–247		
a. Chaos	1–6	Instrumental	Ambiguous fifths layered until R emerges at end
b. Te Deum, Sanctus	7–61	Choir and orchestra	I and RI
c. Creation	62–82	Narrator and orchestra	R δ
d. Creation of man	83–126	Bass duet (represent God)	R and IR
e. Lucifer/Satan	127–167	Bass duet/Tenor solo	R and IR/I, P, IR, and P γ
f. Fall of Man	168–179	Narrator and Speakers	R
g. Noah	180–247	Bass duet and Speaker	P, I, R, IR, RI, RIR
II. The Building of the Ark	248–334	Instrumental (Choreographed)	P, I, R, RI, R γ and R δ
III. The Catalogue of the Animals	335–370	Speaker and Orchestra	P, I, R, IR, P γ , P δ , and I γ
IV. The Comedy	371–398	Speakers and Orchestra	P, IR, P δ , R δ
V. The Flood	399–456	Orchestra (Choreographed)	R, I, and I γ
VI. The Covenant of the Rainbow	457–end		
a. Noahic Covenant	457–489	Bass duet	P, I, R, IR, RI, and RIR
b. Chaos	490–496	Orchestra	Ambiguous fifths
c. Satan	487–525	Tenor solo	RI, P γ , and RI γ
d. Sanctus, Te Deum	526–end		I and RI

retrograde of the inversion of the retrograde (RIR).³¹ In his article *Twelve-note Technique in Stravinsky*, Robert Gerhard points out the tonal relationships within Stravinsky's series for his *Canticum Sacrum*—[Ab, G, F, D, F#, E, Eb, Db, Bb, C, B, A]. Gerhard sees mainly a double fifth relationship between the first notes of each hexachord (Ab and Eb)

³¹ Ibid., 103n.

and the last notes (E and A), creating poles of tonal attraction.³² Lynn Rogers has also shown that Stravinsky's row forms for all of his large serial works, including *The Flood*, "frequent[ly] produce diatonic regions, leading-note effects, suggestions of tonicization, perfect fifth relations, tertian structures, and allusions to dissonance and resolution and tonality and modality."³³ It is apparent in *The Flood* that tonicity is established through the exploitation of tonic/dominant relationships found among series forms (Figure 10). In addition to the tonic/dominant relationship among the different forms, this same relationship is present within individual row forms between the first and last pitches of each series.

P:	C#	B	C	F#	D#	F	E	D	A#	A	G	G#
I:	C#	D#	D	G#	B	A	A#	C	E	F	G	F#
R:	G#	G	A	A#	D	E	F	D#	F#	C	B	C#
IR:	G#	A	G	F#	D	C	B	C#	A#	E	F	D#
RI:	F#	G	F	E	C	A#	A	B	G#	D	D#	C#
RIR:	D#	F	E	A#	C#	B	C	D	F#	G	A	G#

Figure 10. Tonic/dominant relationship among row forms.

As in *A Sermon...*, the melodic content of *The Flood* may be traced through the hexachords of Stravinsky's rotational arrays. A typical employment of these may be seen in measures 118–126 (Figure 11). Here, Stravinsky contrapuntally blends the R and RI rows between two bass solos, representing God.³⁴ At this particular point in the drama,

³² Robert Gerhard, "Twelve-note Technique in Stravinsky," *The Score* 20 (June 1957), 38.

³³ Lynn Rogers, "A Serial Passage of Diatonic ancestry in Stravinsky's *The Flood*," *Journal of the Royal Musical Association* 129, no. 2 (2004), 238.

³⁴ "Stravinsky's God, generally, has a forked tongue—two-part male chorus in *Babel*, two solo basses in *The Flood*." (Louis Andriessen and Elmer Schonberger, *Apollonian Clockwork: On Stravinsky*, trans. Jeff Hamburg, [Oxford: Oxford University Press, 1989], 113). The male duet first appeared in

Figure 11. *The Flood*: God's aria, mm. 118 – 126

God appoints Lucifer as chief angel. The text is set to the R and RI rows beginning on the second pitch, G. By doing this Stravinsky provides the listener with a strong sense of G as being "tonic." Following God's aria, Lucifer, represented by tenor soloist, sings for the first time in measure 130. During his aria Lucifer sings of the pride he has in holding his position and expresses his desire to usurp heaven (mm. 130–146): "The beams of my brightness burn so bright, like a Lord am I left to dwell in this light. More fairer by far than my feres, my power surpasses my peers... I will be highest of heaven!" The tenor

Stravinsky's *The Nightingale* and was used frequently in later works, such as *Renard*, *Oedipus Rex*, and *Threni*. It is worth noting that the bass duet in *The Flood* is accompanied by a continuous bass drum. Perhaps the addition of this third "voice" in the aria signifies the omnipresence of the Holy Trinity.

sings through the complete I, P, and IR row forms ending with a questionable anomalous hexachord at the end. This sequence is outlined in Figure 12.

Measures:

130–133	134–138	139–143	144–146
I	P	IR	AH [G, F#, G#, B#, A#, C#]

Figure 12. Sequence of rows/hexachords mm. 130–146 (Lucifer's aria)

For this brief aria C# (the first pitch of the P and I rows) established as "tonic"—a tritone away from the G that began God's aria—gives the listener a sense of *diabolus in musica*. Lucifer's final phrase in measure 144 reads "I will be highest of heaven" and is set to the hexachord [G, F#, G#, B#, A#, C#]. This ordering of pitches is not found in Stravinsky's arrays. However, by analyzing the interval series of the hexachord, <11,2,4,10,3,(6)>, a similar hexachord is found in the Rβ array, specifically Rβ_{III}, [C, B, C#, F, D#, F#]. It appears that Stravinsky transposed Rβ_{III} up a perfect fifth, or T₇ (Figure 13). A transposition of an Rβ hexachord makes sense considering the aria's sequence of rows I to P then IR to R. The T₇ transposition also reflects the prominent tonic/dominant relationship that is prevalent throughout the work. An analysis of Satan's final aria in measures 487–525 reveals T₇ transpositions of both P and IR row forms (Figure 14).

$$R\beta_{III} [C, B, C\#, F, D\#, F\#] \xrightarrow{T_7} AH [G, F\#, G\#, B\#, A\#, C\#]$$

Figure 13. T₇ transposition of Rβ_{III}

130 **I**

LUCIFER (LUZIFER)

The beams of my bright-ness burn— so bright

P

Like a lord am I left to dwell in this light...

IR

More fai-rer by far than my feres, My pow-er

(17 of RBIIIr)

sur-pas-ses my peers... I will be high-est of Hea-ven! oh!

what! oh Deuce! All goes down! Out, out,horror! helpless,

hot, hot, hot.

Figure 14. *The Flood*: Lucifer's aria, mm. 130–146

The Flood by Igor Stravinsky
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There are three possible explanations for Stravinsky's deviation from his charts, which all fall under the umbrella of symbolism.³⁵ First, for Lucifer to "be highest of heaven" he must take on the role of God symbolized in the music by taking on the G "tonicity" established by God in the preceding section. Second, the transformation of Lucifer into Satan, which in the play occurs at the point of the anomalous hexachord, is symbolized in the transposition of the R β _{III} hexachord. Finally, the transposition of the R β _{III} hexachord also symbolizes Lucifer's perversion of the Creator's work, which is seen more clearly in the next scene where he, Satan, successfully tempts Eve to eat from the forbidden tree.

It is clear from Stravinsky's working notes for *The Flood* that he intended for Lucifer's vanity to be expressed musically. "Satan walks on a carpet of complex and sophisticated music . . . The music that accompanies his ambitions is also . . . the music that accompanies his fall."³⁶ His allusion to the anomalous hexachord appears in his comment that "[Lucifer] jumps to a higher rock with each chord, but misses the last one."³⁷ Considering the sequence of row forms of Lucifer's aria and their underlying tonal relationships, particularly each row's tonal implication (Figure 15 shows that rows P and I are inversionally balanced around a C# "tonic" and R and IR around a G# "dominant"), the listener should expect to hear row R in the concluding measures. Perhaps the "rock" Lucifer misses is the R row and its inversional balance around G#.

³⁵ Stravinsky states that "*The Flood* music is, structurally speaking, all symbolic." *Dialogues*, 72.

³⁶ Igor Stravinsky and Robert Craft, *Expositions and Developments*, (Berkeley: University of California Press, 1901), 124.

³⁷ Stravinsky and Craft, *Dialogues*, 74.

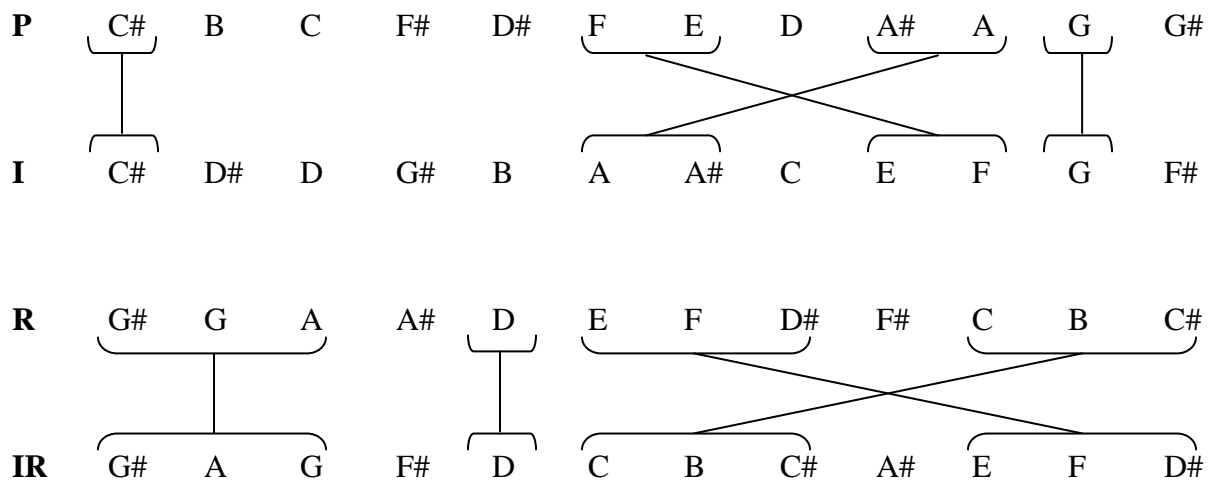


Figure 15. Inversional balance among rows P and I and R and IR

CHAPTER IV ABRAHAM AND ISAAC

The "sacred ballad" *Abraham and Isaac*, composed for baritone solo and chamber orchestra, was completed in 1963 and dedicated to the people of the State of Israel.³⁸ Stravinsky's only work set in Hebrew, *Abraham and Isaac* is a setting of verses 1–19 of Genesis chapter 22 (English Standard Version), in which God commands Abraham to offer Isaac, Abraham's son, as a burnt offering. Not knowing Hebrew, Stravinsky relied on meetings with philosopher Isaiah Berlin to translate and read the text aloud.³⁹ Hearing the text allowed Stravinsky to exploit musical aspects of the Hebrew language (i.e. accentuation and timbre). "Though the verses are sometimes expressed in dialogue form in the Bible, [Stravinsky's] setting does not impersonate the protagonists, but tells the story through the baritone-narrator."⁴⁰ The change of speaker is indicated through changes in dynamics, range, and pitch centricity. (C# and F are central pitches as they are often repeated and doubled, and consistently used as a point of departure.) For example, God and the Angel of the Lord are identified by a high tessitura and the tendency to arrive at C# (Figure 16).



Figure 16. God calling to Abraham in mm. 20–22 of *Abraham and Isaac*

³⁸ Roman Vlad, *Stravinsky*, (New York: Oxford University Press, 1978), 242.

³⁹ Walsh, 46.

⁴⁰ Igor Stravinsky and Robert Craft, *Themes and Episodes*, (New York: Alfred A. Knopf, 1966),

For *Abraham and Isaac*, Stravinsky again employed his four preferred row forms, P, I, R, and IR, but also chose to use the RI form. The prime form is [F, F#, E, D, D#, B, A, G, G#, A#, C, C#].⁴¹ In this work, the composer used a method of hexachord application that Claudio Spies has called "spiraling," through which Stravinsky exploits the explicit invariance of transposed rotated hexachords by systematically weaving through the arrays.⁴² Most of the melodic content of *Abraham and Isaac* can be accounted for through this systematic spiraling through the arrays. Figures 17 and 18 provide an example of spiraling in measures 136–162 of *Abraham and Isaac*. Stravinsky is again methodical in his approach to hexachord usage. However, a sequence of anomalous hexachords begins at measure 184 and continues through measure 194 (Figure 19). These hexachords do not appear horizontally or vertically in Stravinsky's charts; however, they may be seen in the unconventional diagonal reading of the arrays (Figure 20). For this analysis the *solidus* symbol (/) is used to express the bottom-left to

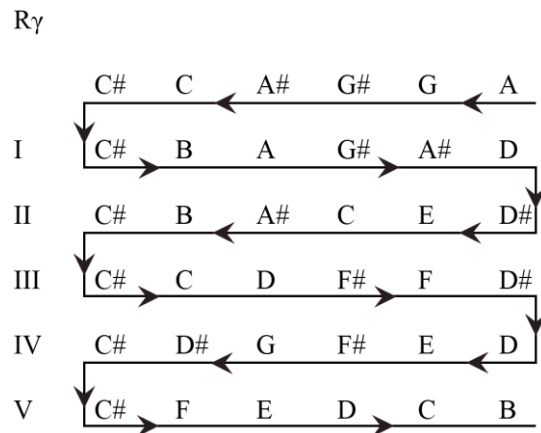


Figure 17. Spiraling through the R γ array

⁴¹ Straus notes that previous analyses of *Abraham and Isaac* "erroneously take the first twelve notes of the piece, G-G#-A#-B#-C#-A-B-D#-D-E-F#-F, as the P-form" (*Stravinsky's Late Music*, 87–89).

⁴² Claudio Spies, "Some Notes on Stravinsky's *Requiem Canticles*," *Perspectives of New Music* 5, no. 2 (1967), 121.

R γ I And they went both of them together. **R γ IIIr** And they came to the place of

וַיֵּלְכוּ - שְׁנֵי - הֵם - יַחַד - וַיָּבֹאוּ - אֶל - הַמָּקוֹם - אֲשֶׁר -

VA - YEYL - KHU SHNEY - HEM YAKH - DAV. VA - YA - VO - U EL HA - MA - KOM A -

R γ III which (he) told him God; **R γ IIIr** And (he) built there Abraham **R γ V**

אֲשֶׁר - שָׁמַר לוֹ אֱלֹהִים וַיִּבְנֶה שָׁם אַבְרָהָם

- SHER A - MAR LO HA' - E - LO - HIM VA - YI - VNE SHAM AV - RA - HAM

an altar, **R γ IVr** and laid out the wood

אֶת - הַמִּזְבֵּחַ - וַיִּצַּד אֶת - הָעֵצִים

ET HA - MIZ - BEY - AKH VA - YA - A - ROKH ET - HA EY -

R γ III and bound **R γ IIIr** Isaac his son, and laid

וַיַּשְׁבֵּד - יִצְחָק בְּנוֹ וַיִּשֶׁב

- TZIM VA - YA - A - KOD ET YITZ - KHAK - B(e)NO VA - YA - SE -

R γ I him on the altar, **R γ Vr** on top of

אֹתוֹ אֶל - הַמִּזְבֵּחַ - וַיַּעַל מֵעַל - הָאֵל

- (E)M O - TO AL HA - MIZ - BEY - AKH MI - MA' - AL

the wood. **R γ Ir** And (he) stretched forth Abraham his hand,

וַיִּשָׂא אַבְרָהָם אֶת - יָדוֹ וַיִּשְׁתַּחֲוֶה

LA - EY - TZIM. VA - YISH - LAKH AV - RA - HAM ET YA - DO VA -

R γ IIIr and he took the knife **R γ IV** to slaughter his son.

וַיִּקַּח אֶת - הַכַּף וַיַּשְׁחֵט אֶת - בְּנוֹ

- YI - KAKH ET HA - MA' - A - KHE LET LISH - KHOT - ET B(e)NO.

Figure 18. Spiraling in *Abraham and Isaac* mm. 136–162

Measure:

184–185

AH 1 [F, C#, D, C, A#, B]⁴³
 <8, 1, 10, 10, 1, (6)>

185–186

AH 2 [C#, D#, D, C, A#, A]
 <2, 1, 10, 10, 11, (4)>

186

AH 3 [A, G, G#, A#, B#, C#]
 <10, 1, 2, 2, 1, (8)>

186–187

AH 4 [C#, E, D, F#, G, F]
 <3, 10, 4, 1, 10, (8)>

188–190

AH 5 [C#, D#, D, C, A#, A]
 <2, 11, 10, 10, 11, (4)>

192–194

AH 6 [B, A#, D#, F#, G, C]
 <11, 5, 3, 1, 4, (11)>

The image shows four staves of musical notation in bass clef, with Hebrew lyrics underneath. The music is in a key with one sharp (F#). The lyrics are: "And (he) lifted Abraham his eyes, and saw behold! ram (was) behind (him) caught in a thicket by his horns. And (he) went Abraham and took the ram and brought him up for a burnt offering in place of his son." Annotations include circled hexachord labels Pγ, RIγ, Iγr, and Rδ, and boxed labels Rγ and Rδ. The lyrics are: VA - YI SA AV - RA - HAM - ET EY - NAV VA - YAR V(e)HI - NEH A' - YIL A - KHAR NE - E - KHAZ BAS - VAKH B(e) KAR - NAV. VA - YEY - LEKH AV - RA - HAM VA - YI - KAKH ET HA' A - YIL VA' - YA - A - LEY - HU L(e)O - LAH TA - KHAT B(e)NO

Figure 19. Sequence of anomalous hexachords, *Abraham and Isaac* mm. 184 – 194

Abraham and Isaac by Igor Stravinsky

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⁴³ Joseph Straus ("Stravinsky's Serial Mistakes," 266) analyzes the F as a mistake and suggests that it should be corrected to G (as in the second hexachord of the Rδ array). However, the F makes more sense in that: (1) it is the first note in the section (an unlikely place for a mistake); (2) it has more weight in the hierarchy of pitches in this work, which demonstrates F-C# centricity; and (3) the hexachord beginning on F is the logical choice in the sequence of hexachords that follows (to be discussed).

Pγ/ (mm. 184–185)

F	F#	E	D	D#	D#
F	D#	C#	D	A#	E
F	D#	E	C	F#	G
F	F#	D	G#	A	G
F	C#	G	G#	F#	E
F	B	C	A#	G#	A

Rγ/ (mm. 185–186 and 188–191)

C#	C	A#	G#	G	A#
C#	B	A	G#	A#	D
C#	B	A#	C	E	D#
C#	C	D	F#	F	D#
C#	D#	G	F#	E	D
C#	F	E	D	C	B

RIγ/ (m. 186)

A	A#	C	D	D#	C#
A	B	C#	D	C	G#
A	B	C	A#	F#	G
A	A#	G#	E	F	G
A	G	D#	E	F#	G#
A	F	F#	G#	A#	B

Iγr (mm. 186–187)

F	E	F#	G#	G	B
F	G	A	G#	C	F#
F	G	F#	A#	E	D#
F	E	G#	D	C#	D#
F	A	D#	D	E	F#
F	B	A#	C	D	C#

Rδ\ (mm. 192–194) [Rδ/ (mm. 186–187 clarinet)]

A#	C#	D	C	E	D#
A#	B	A	C#	C	G
A#	G#	C	B	F#	A
A#	D	C#	G#	B	C
A#	A	E	G	G#	F#
A#	F	G#	A	G	B

Figure 20. Diagonals used in *Abraham and Isaac*

Measure:	184–185	185–186	186	186–187	188–190	192–194
	P γ /	R γ /	RI γ /	I γ /r	R γ /	R δ \

Figure 21. Revised sequence of hexachords in mm. 189–194 with diagonal labels

top-right diagonal of the array; (\backslash) is used to express the top-left to the bottom-right diagonal; r infers a retrograde reading of the diagonal.⁴⁴

It is important to note that these diagonals occur at a pivotal point in the redemption story being told in the text. The text translates, "And Abraham lifted his eyes, and behold, he saw a ram behind him caught in a thicket by his horns. And Abraham went and took the ram." Here, at the climax of this drama, the tides are turned instantly; as Abraham is about to slay his son, God provides a substitute sacrifice in the ram. God's provision of the ram to be slain in place of Isaac is symbolized by Stravinsky in his use of the diagonal slicing of the arrays.

While Stravinsky never publicly admitted to using diagonals of the arrays in his composition, there is evidence to further support this analysis. Inspired by the annotations made by Stravinsky in his arrays, in which he traced the transposition operation with diagonal lines, Charles Wuorinen made use of rotational array diagonals in his composition *A Reliquary for Igor Stravinsky*. Louis Karchin, in his analysis of Wuorinen's *Reliquary*, recalls Robert Craft's comment suggesting that Stravinsky toyed with the idea of making use of the diagonals of his arrays, though Craft does not cite a

⁴⁴ John Rogers discusses these types of diagonals in "Some Properties of Non-Duplicating Rotational Arrays," *Perspectives of New Music* 7, no. 1 (1968), 80 – 102.

specific instance within Stravinsky's catalogue of serial works.⁴⁵ There is also a correlation in Stravinsky's writing of this section with his approach to the third movement of his *Symphony of Psalms*. Stravinsky, inspired by Elijah's chariot ascending into heaven, composed a dramatic ascending triplet passage beginning at rehearsal number 18 in the *Symphony* (Figure 22).⁴⁶ Perhaps Stravinsky was similarly inspired by the vision of Abraham lifting his eyes to see his son saved by the sacrificial ram to compose mm. 184–190 with the *ascending* diagonals. Though not an audible ascension in this case, the visual ascent seen in the rotation chart is significant.



Figure 22. Dramatic ascent in *Symphony of Psalms*, rehearsal number 18

⁴⁵ Louis Karchin, "Charles Wuorinen's *Reliquary for Stravinsky*," (*Contemporary Music Review* 20, no. 4, 2001), 17.

⁴⁶ Igor Stravinsky and Robert Craft, *Dialogues and a Diary*, (New York: Doubleday, 1963), 78.

CHAPTER V REQUIEM CANTICLES

The last of Stravinsky's major compositions, *Requiem Canticles*, scored for chorus, four vocal soloists, and orchestra, was completed in 1966. The work is Stravinsky's first to employ two twelve-tone series. The first series [F, G, D#, E, F#, C#, B, C, D, A, G#, A#] is used in the Exaudi, Rex Tremendae, and Lacrimosa movements; and the second series [F, C, B, A, A#, D, C#, D#, G#, F#, E, G] is used in the Prelude, Dies Irae, Tuba Mirum, and Libera Me movements. The Interlude and Postlude movements each incorporate both series. Arrays of rotated and transposed hexachords derived from the P, I, R, and IR forms of the series were employed throughout the composition.⁴⁷ As in Stravinsky's previous serial works, the systematic working through the arrays was the primary method for establishing melody. For instance, the Lacrimosa movement employs spiraling through the IR γ and IR δ arrays (Figures 23 and 24).

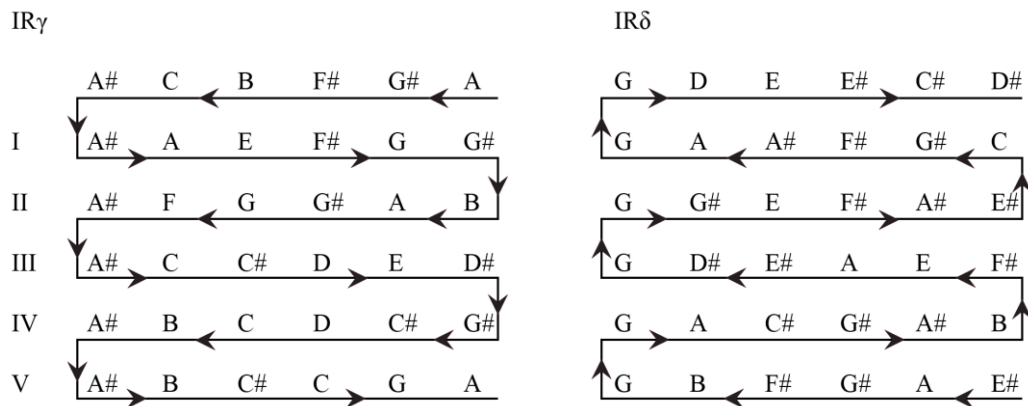


Figure 23. Spiraling through the IR arrays

⁴⁷ Straus, *Stravinsky's Late Music*, 243.

LACRIMOSA

$\text{♩} = 132$ **IRδVr** accel. a tempo

Contralto Solo

La - - - - - cri - mo - sa,

IRδIV la - cri - mo - sa di - cs il - la,

IRδIIIr Qua - re - sur - get,

IRδII re - sur - get ex fa - vil - la,

IRδIr Ju - di - can - dus, ju - di - can - dus, ju - di - can -

IRδ - dus ho - mo re - us, -

IRγr Hu - ic er - go par - ce De - us. -

IRγI Pi - e Je - su Do - mi - ne, **IRγIIr** do - na, -

IRγIII do - na e - is, **IRγIVr** do - na e - is re - qui - em.

IRγV A men, a men.

poco rit.

Figure 24. Spiraling in “Lacrimosa” from *Requiem Canticles*

Requiem Canticles by Igor Stravinsky
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Anomalous hexachords are found early in *Requiem Canticles*, appearing in the Prelude movement. The Prelude is a jarring lament representing the emotion one might express when experiencing loss.⁴⁸ Four episodes of instrumental solos represent weeping. Each episode is set to hexachords found in Stravinsky's rotational arrays based on the first series. The first episode consists of $P\delta_{vr}$ in the first violin line of measures 4–7. This episode is expanded to include an anomalous hexachord in its subsequent repetitions. With each entrance the episodes of wailing are intensified by the addition of a hexachord layered with the previously used hexachords. The sequence of layered hexachords is outlined in Table 3 and traced through the score in Figure 25.

Table 3 Sequence of layered hexachords in the Prelude movement of *Requiem Canticles*

Episode	1	2		3		4	
Measures	4–7	12–15	15–19	26–29	29–33	39–42	42–46
Hexachords	$P\delta_{vr}$	$P\delta_{vr}$ $P\gamma$	AH1r AH1	$P\delta_{vr}$ $P\gamma$ $P\delta_{IV}$	AH1r AH1 $P\delta_{IV}$ (cont.)	$P\delta_{vr}$ $P\gamma$ $P\delta_{IV}$ $I\gamma_v$	AH1r AH1 $P\delta_{IV}$ (cont.) $I\delta_v$

⁴⁸ Jeffrey Perry, "A 'Requiem for the Requiem': On Stravinsky's *Requiem Canticles*," *College Music Symposium* 33 and 34 (2004), 3.

PRELUDE

Tutte semicrome eguale, $\text{♩} = 250$

PδVr

5/16 *mf ben marc.* 7/16 *sempre stacc.* 5/16

5

6/16 5/16 8/16 *come sopra* 5/16

PδVr

10

5/16

2/8 (=5/16)

Py

sempre stacc.

AH 1r

15

AH 1

7/16

Figure 25. Hexachords of the Prelude of *Requiem Canticles*

(continued)

(Figure 25 continued)

The musical score is presented in four systems, each with a measure number in a box at the beginning. The notation includes treble and bass staves for piano accompaniment and a vocal line. Measure 20 is marked with a box containing '20' and includes the instruction 'come sopra'. Fingerings '7/16' and '5/16' are indicated above the piano parts. Measure 25 is marked with a box containing '25' and includes a 'PøIV' annotation. Fingerings '2/8(-5/16)' and '3' are shown. Measure 30 is marked with a box containing '30' and features triplets. Measure 35 is marked with a box containing '35' and includes fingerings '3', '(5/16)', '7/16', and '5/16'. The score uses various musical symbols such as slurs, ties, and dynamic markings.

(continued)

(Figure 25 concluded)

Musical score for measures 40-43. The system includes a treble clef staff, a grand staff (treble and bass clefs), and a separate bass clef staff. Measure 40 is marked with a box containing the number 40. The grand staff shows a treble clef staff with a 5/16 time signature and a bass clef staff with a 2/8 (-5/16) time signature. A box labeled I_7V is placed over the grand staff in measure 41. The separate bass clef staff contains a continuous eighth-note accompaniment. Trills and triplets are indicated in the treble staff.

Musical score for measures 44-47. The system includes a treble clef staff, a grand staff (treble and bass clefs), and a separate bass clef staff. Measure 45 is marked with a box containing the number 45. The grand staff shows a treble clef staff with a 3/8 time signature and a bass clef staff with a 3/8 time signature. A box labeled I_8V is placed over the grand staff in measure 45. The separate bass clef staff contains a continuous eighth-note accompaniment. Trills and triplets are indicated in the treble staff.

Musical score for measures 48-51. The system includes a treble clef staff, a grand staff (treble and bass clefs), and a separate bass clef staff. Measure 48 is marked with a box containing the number 48. The grand staff shows a treble clef staff with a 3/8 time signature and a bass clef staff with a 3/8 time signature. The separate bass clef staff contains a continuous eighth-note accompaniment. Trills and triplets are indicated in the treble staff.

Musical score for measures 52-56. The system includes a treble clef staff, a grand staff (treble and bass clefs), and a separate bass clef staff. Measure 50 is marked with a box containing the number 50. The grand staff shows a treble clef staff with a 3/8 time signature and a bass clef staff with a 3/8 time signature. The separate bass clef staff contains a continuous eighth-note accompaniment. Trills and triplets are indicated in the treble staff.

The first occurrence of AH 1 is in the second violin line accompanied by a retrograde form of the hexachord in the first violin line of measures 15–19. This area is described by Anthony Payne as a "transgression" of the law that governs Stravinsky's method of composition:

The second violin line moves from O-F to a garbled R-F (the note order is 4, 5, 6,7, 3) with 1 and 2 accounted for in the accompaniment as it stood at the first statement) (See Figure 26).⁴⁹

The label "O-F" represents the original, or prime, form of the series beginning on the pitch F; and "R-F" represents the retrograde form of the original series beginning with the pitch F:

G	E	F#	G#	D#	C#	D	A#	A	B	C	F
1	2	3	4	5	6	7	8	9	10	11	12

This "garbled R-F" analysis of the pitch class set [G#, D#, C#, D, F#] of the second violin line beginning in measure 16 poses two problems. First, the use of a pentachord is inconsistent with Stravinsky's method of hexachordal rotation, which is clearly evident throughout the work. The second discrepancy is a disregard for the starting pitch (F) of the second violin line, found in the final beat of measure 15. This F, given its stem-up notation, is clearly the start of the second phrase of the second violin line—not the proceeding G#, as Payne suggests. A new analysis must reinterpret the pitch set of the second violin line at measures 15–19 as [F, G#, D#, C#, D, F#]. The contrapuntal juxtaposition with its retrograde, [F#, D, C#, D#, G#, F], found in the first violin line, confirms the intentional use of this hexachord. Additionally, Stravinsky's use of

⁴⁹ Anthony Payne, "Requiem Canticles" *Tempo*, no. 81 (Autumn, 1967): 12.

hexachords as a compositional precept favors an analysis that describes the use of these hexachords over Payne's garbled pentachord analysis.

The image shows three systems of musical notation for piano accompaniment. The first system starts at measure 10 and includes a 'Note order: 1' label. The second system starts at measure 15 and includes a '2' label. The third system ends at measure 16 and includes a '7 16' label. The notation includes treble and bass staves with various rhythmic values, accidentals, and articulation marks.

Figure 26. Anthony Payne's analysis of mm. 12–19 of the Prelude movement of *Requiem Canticles*

A thorough analysis of the hexachords used in the Prelude movement reveals a significant tonal implication. The row used in the Prelude contains two hexachords whose prime forms are (012358) for the first hexachord (H1) and (012457) for the second hexachord (H2). It appears that Stravinsky has set up various forms of these hexachords to create a sort of series of "dissonances" and "resolutions" for each episode. For instance, the sequence of hexachords, previously illustrated in Table 3, seen in their prime forms reveals a consistent resolution of the combined H1 and H2 dissonance to H2 (Table 4).

Table 4. Sequence of hexachords in the Prelude movement of *Requiem Canticles* (resolution to H2)

Episode	1	2		3		4	
Measures	4–7	12–15	15–19	26–29	29–33	39–42	42–46
Hexachords	H2	H2	H2	H2	H2	H2	H2
		H1	H2	H1	H2	H1	H2
				H2	H2 (cont.)	H2	H2 (cont.)
						H1	H2

The various forms of the first two hexachords, $P\delta_{vI}$ and $P\gamma$, may have been created through operations of transposition and inversion. For example, $P\delta_{vI}$ in normal order reads [G, A, A#, C, C#, D] and under the inversion operation of T_3I becomes [C#, D, D#, F, F#, G#], which is the normal order of AH1. Likewise, $P\delta_{vI}$ under T_3 is $P\delta_{IV}$; $P\delta_{vI}$ under $T_{10}I$ is $I\delta_v$; and $P\gamma$ under T_7I is $I\gamma$. Theoretically, these transformations work, but it has been said that Stravinsky was not so academically minded in his composition.⁵⁰ Whatever the method, the retention of intervals is key to his musical product.

Discounting the use of transposition and inversion operations, the question of the origination of AH1 remains. Although Stravinsky's chart does not produce the exact hexachord in question, it does contain a similar one, $P\gamma_v$. The invariance between AH1 and $P\gamma_v$ cannot be ignored. First, the trichord [F, G#, D#] is shared:

Violin II – AH 1: [F, G#, D#, C#, D, F#]

$P\gamma_v$: [F, G#, D#, D, C, C#]

⁵⁰ Milton Babbitt, "Remarks on Recent Stravinsky," *Perspectives of New Music* 2, no. 2 (1964), 171–172; Charles Wuorinen has also made a similar comment, see Karchin, 17.

Second, the invariance between the interval series of these two hexachords is clearly seen:

Violin II – AH 1: <3,7,10,1,4,(11)>

P γ _v: <3,7,11,10,1,(4)>

It is possible that Stravinsky has once again has used a double rotation operation as in *A Sermon...*, this time rotating the interval series of the second trichord (Figure 27). Interval rotation within the hexachord effectively communicates turbulent grief expressed in the Prelude.

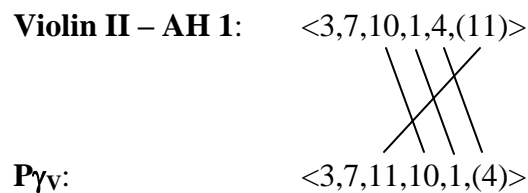


Figure 27. Rotation of the interval series of P γ _v.

As many scholars have pointed out in Stravinsky's works, the treatment of intervals is what makes his compositions cogent musical products. Stravinsky's compositional method is also marked by his intervallic consistency, which generates organized music in any pitch system.

Conclusion

Other serial techniques were considered during the course of this analysis. It may be supposed that Ernst Krenek, highly esteemed by Stravinsky, may have influenced Stravinsky in other rotational techniques. For instance, Krenek employed rotated dyads in

his *Circle, Chain, and Mirror* (1956–57) (Figure 28)⁵¹, and he used rotation in his *Sestina* (1957) "switching the position of every two [pitches] equidistant from the center of the series, proceeding from the end toward the middle" (Figure 29).⁵² These operations of rotation were not found to be employed by Stravinsky.

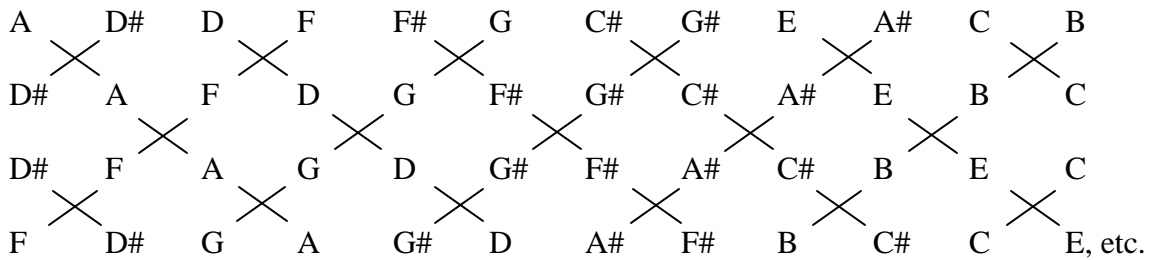


Figure 28. Rotation of dyads used in Krenek's *Circle, Chain, and Mirror* (1956-57)

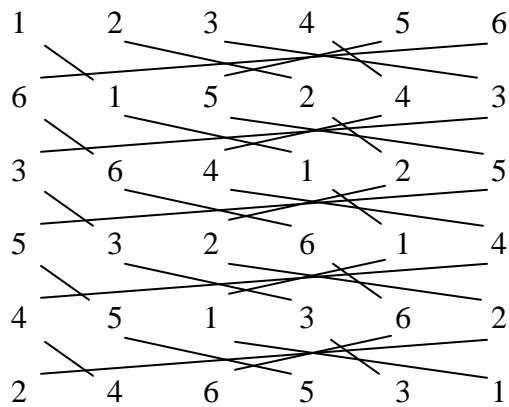


Figure 29. System of rotation used in Krenek's *Sestina* (1957)

Also, it does not appear that Stravinsky had been influenced by Pierre Boulez's use of rotation, as exemplified in Boulez's *Douze Notations pour Piano* (1948). In this

⁵¹ Ernst Krenek, "The Extents and Limits of Serial Technique," *The Musical Quarterly* 46, no. 2 (1960), 213.

⁵² *Ibid.*, 223.

composition, where all characteristics seem to be dictated by the number 12, Boulez employs rotations of the entire twelve-tone row (Figure 30).⁵³

Ab	Bb	Eb	D	A	E	C	F	C#	G	F#	B
Bb	Eb	D	A	E	C	F	C#	G	F#	B	Ab
Eb	D	A	E	C	F	C#	G	F#	B	Ab	Bb, etc.

Figure 30. Twelve-tone row rotation used in Boulez's *Douze Notations pour Piano* (1948)

What is evident in this analysis of *A Sermon, a Narrative, and a Prayer*, *The Flood, Abraham and Isaac*, and *Requiem Canticles* is Stravinsky's adherence to the strictures of musical composition he has set in place. His philosophy states "the more art is controlled, limited, worked over, the more it is free."⁵⁴ At the same time, Stravinsky, through text painting, justifies his freedom to move away from the precompositional parameters set forth in his rotational arrays. Though some would explain his anomalous hexachords as mistakes or ignore them altogether, we see that they were deliberately used and follow Stravinsky's guidelines for his compositional process.

⁵³ Jeremy David Sagala, "Rotational Arrays in the Music of Boulez," (unpublished paper, 2004), 1.

⁵⁴ Stravinsky, *Poetics of Music*, 64.

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APPENDIX

I. Rotational Arrays for *A Sermon, a Narrative, and a Prayer* (1961)

		Prime (P)														
		α						β								
Intervals:	<	1	8	2	11	9	(5)	>	<	7	1	2	11	9	(6)	>
		D#	E	C	D	C#	A#		B	F#	G	A	G#	F		
I		E	C	D	C#	A#	D#		F#	G	A	G#	F	B		
II		C	D	C#	A#	D#	E		G	A	G#	F	B	F#		
III		D	C#	A#	D#	E	C		A	G#	F	B	F#	G		
IV		C#	A#	D#	E	C	D		G#	F	B	F#	G	A		
V		A#	D#	E	C	D	C#		F	B	F#	G	A	G#		
		γ						δ								
		D#	E	C	D	C#	A#		B	F#	G	A	G#	F		
I		D#	B	C#	C	A	D		B	C	D	C#	A#	E		
II		D#	F	E	C#	F#	G		B	C#	C	A	D#	A#		
III		D#	D	B	E	F	C#		B	A#	G	C#	G#	A		
IV		D#	C	F	F#	D	E		B	G#	D	A	A#	C		
V		D#	G#	A	F	G	F#		B	F	C	C#	D#	D		
		Inversion (I)														
		α						β								
Intervals:	<	11	4	10	1	3	(7)	>	<	5	11	10	1	3	(6)	>
		D#	D	F#	E	F	G#		G	C	B	A	A#	C#		
I		D	F#	E	F	G#	D#		C	B	A	A#	C#	G		
II		F#	E	F	G#	D#	D		B	A	A#	C#	G	C		
III		E	F	G#	D#	D	F#		A	A#	C#	G	C	B		
IV		F	G#	D#	D	F#	E		A#	C#	G	C	B	A		
V		G#	D#	D	F#	E	F		C#	G	C	B	A	A#		
		γ						δ								
		D#	D	F#	E	F	G#		G	C	B	A	A#	C#		
I		D#	G	F	F#	A	E		G	F#	E	F	G#	D		
II		D#	C#	D	F	C	B		G	F	F#	A	E	G#		
III		D#	E	G	D	C#	F		G	G#	B	F	A#	A		
IV		D#	F#	C#	C	E	D		G	A#	E	A	G#	F#		
V		D#	A#	A	C#	B	C		G	C#	F#	F	D#	E		

(continued)

Rotation Arrays for *A Sermon, a Narrative, and a Prayer* (1961) concluded

Retrograde (R)

	α								β						
Intervals:	<	3	1	10	11	5	(6)	>	<	3	1	10	4	11	(7)>
	F	G#	A	G	F#	B			A#	C#	D	C	E	D#	
I	G#	A	G	F#	B	F			C#	D	C	E	D#	A#	
II	A	G	F#	B	F	G#			D	C	E	D#	A#	C#	
III	G	F#	B	F	G#	A			C	E	D#	A#	C#	D	
IV	F#	B	F	G#	A	G			E	D#	A#	C#	D	C	
V	B	F	G#	A	G	F#			D#	A#	C#	D	C	E	

	γ								δ						
	F	G#	A	G	F#	B			A#	C#	D	C	E	D#	
I	F	F#	E	D#	G#	D			A#	B	A	C#	C	G	
II	F	D#	D	G	C#	E			A#	G#	C	B	F#	A	
III	F	E	A	D#	F#	G			A#	D	C#	G#	B	C	
IV	F	A#	E	G	G#	F#			A#	A	E	G	G#	F#	
V	F	B	D	D#	C#	C			A#	F	G#	A	G	B	

Inversion of the Retrograde (IR)

	α								β						
Intervals:	<	9	11	2	1	7	(6)	>	<	9	11	2	8	1	(5)>
	F	D	C#	D#	E	B			C	A	G#	A#	F#	G	
I	D	C#	D#	E	B	F			A	G#	A#	F#	G	C	
II	C#	D#	E	B	F	D			G#	A#	F#	G	C	A	
III	D#	E	B	F	D	C#			A#	F#	G	C	A	G#	
IV	E	B	F	D	C#	D#			F#	G	C	A	G#	A#	
V	B	F	D	C#	D#	E			G	C	A	G#	A#	F#	

	γ								δ						
	F	D	C#	D#	E	B			C	A	G#	A#	F#	G	
I	F	E	F#	G	D	G#			C	B	C#	A	A#	D#	
II	F	G	G#	D#	A	F#			C	D	A#	B	E	C#	
III	F	F#	C#	G	E	D#			C	G#	A	D	B	A#	
IV	F	C	F#	D#	D	E			C	C#	F#	D#	D	E	
V	F	B	G#	G	A	A#			C	F	D	C#	D#	B	

II. Rotational Arrays for *The Flood* (1962)

		Prime (P)															
		α							β								
Intervals:		<	10	1	6	9	2	(8)	>	<	10	8	11	10	1	(8)	>
		C#	B	C	F#	D#	F			E	D	A#	A	G	G#		
I		B	C	F#	D#	F	C#			D	A#	A	G	G#	E		
II		C	F#	D#	F	C#	B			A#	A	G	G#	E	D		
III		F#	D#	F	C#	B	C			A	G	G#	E	D	A#		
IV		D#	F	C#	B	C	F#			G	G#	E	D	A#	A		
V		F	C#	B	C	F#	D#			G#	E	D	A#	A	G		

		γ							δ								
		C#	B	C	F#	D#	F			E	D	A#	A	G	G#		
I		C#	D	G#	F	G	D#			E	C	B	A	A#	F#		
II		C#	G	E	F#	D	C			E	D#	C#	D	A#	G#		
III		C#	A#	C	G#	F#	G			E	D	D#	B	A	F		
IV		C#	D#	B	A	A#	E			E	F	C#	B	G	F#		
V		C#	A	G	G#	D	B			E	C	A#	F#	F	D#		

		Inversion (I)															
		α							β								
Intervals:		<	2	11	6	3	10	(4)	>	<	2	4	1	2	11	(4)	>
		C#	D#	D	G#	B	A			A#	C	E	F	G	F#		
I		D#	D	G#	B	A	C#			C	E	F	G	F#	A#		
II		D	G#	B	A	C#	D#			E	F	G	F#	A#	C		
III		G#	B	A	C#	D#	D			F	G	F#	A#	C	E		
IV		B	A	C#	D#	D	G#			G	F#	A#	C	E	F		
V		A	C#	D#	D	G#	B			F#	A#	C	E	F	G		

		γ							δ								
		C#	D#	D	G#	B	A			A#	C	E	F	G	F#		
I		C#	C	F#	A	G	B			A#	D	D#	F	E	G#		
II		C#	G	A#	G#	C	D			A#	B	C#	C	E	F#		
III		C#	E	D	F#	G#	G			A#	C	B	D#	F	A		
IV		C#	B	D#	F	E	A#			A#	A	C#	D#	G	G#		
V		C#	F	G	F#	C	D#			A#	D	E	G#	A	B		

(continued)

Rotation Arrays for *The Flood* (1962) continued

Retrograde (R)

	α						β									
Intervals:	<	11	2	1	4	2	(4)	>	<	10	3	6	11	2	(4)	>
	G#	G	A	A#	D	E			F	D#	F#	C	B	C#		
I	G	A	A#	D	E	G#			D#	F#	C	B	C#	F		
II	A	A#	D	E	G#	G			F#	C	B	C#	F	D#		
III	A#	D	E	G#	G	A			C	B	C#	F	D#	F#		
IV	D	E	G#	G	A	A#			B	C#	F	D#	F#	C		
V	E	G#	G	A	A#	D			C#	F	D#	F#	C	B		

	γ						δ									
	G#	G	A	A#	D	E			F	D#	F#	C	B	C#		
I	G#	A#	B	D#	F	A			F	G#	D	C#	D#	G		
II	G#	A	C#	D#	G	F#			F	B	A#	C	E	D		
III	G#	C	D	F#	F	G			F	E	F#	A#	G#	B		
IV	G#	A#	D	C#	D#	E			F	G	B	A	C	F#		
V	G#	C	B	C#	D	F#			F	A	G	A#	E	D#		

Retrograde Inversion (RI)

	α						β									
Intervals:	<	1	10	11	8	10	(8)	>	<	2	9	6	1	10	(8)	>
	F#	G	F	E	C	A#			A	B	G#	D	D#	C#		
I	G	F	E	C	A#	F#			B	G#	D	D#	C#	A		
II	F	E	C	A#	F#	G			G#	D	D#	C#	A	B		
III	E	C	A#	F#	G	F			D	D#	C#	A	B	G#		
IV	C	A#	F#	G	F	E			D#	C#	A	B	G#	D		
V	A#	F#	G	F	E	C			C#	A	B	G#	D	D#		

	γ						δ									
	F#	G	F	E	C	A#			A	B	G#	D	D#	C#		
I	F#	E	D#	B	A	F			A	F#	C	C#	B	G		
II	F#	F	C#	B	G	G#			A	D#	E	D	A#	C		
III	F#	D	C	G#	A	G			A	A#	G#	E	F#	D#		
IV	F#	E	C	C#	B	A#			A	G	D#	F	D	G#		
V	F#	D	D#	C#	C	G#			A	F	G	E	A#	B		

(continued)

Rotation Arrays for *The Flood* (1962) concluded

Inversion of the Retrograde (IR)

	α							β								
Intervals:	<	1	10	11	8	10	(8)	>	<	2	9	6	1	10	(8)	>
	G#	A	G	F#	D	C			B	C#	A#	E	F	D#		
I	A	G	F#	D	C	G#			C#	A#	E	F	D#	B		
II	G	F#	D	C	G#	A			A#	E	F	D#	B	C#		
III	F#	D	C	G#	A	G			E	F	D#	B	C#	A#		
IV	D	C	G#	A	G	F#			F	D#	B	C#	A#	E		
V	C	G#	A	G	F#	D			D#	B	C#	A#	E	F		

	γ							δ								
	G#	A	G	F#	D	C			B	C#	A#	E	F	D#		
I	G#	F#	F	C#	B	G			B	G#	D	D#	C#	A		
II	G#	G	D#	C#	A	A#			B	F	F#	E	C	D		
III	G#	E	D	A#	B	A			B	C	A#	F#	G#	F		
IV	G#	F#	D	D#	C#	C			B	A	F	G	E	A#		
V	G#	E	F	D#	D	A#			B	G	A	F#	C	C#		

Retrograde of the Inversion of the Retrograde (RIR)

	α							β								
Intervals:	<	2	11	6	3	10	(4)	>	<	2	4	1	2	11	(4)	>
	D#	F	E	A#	C#	B			C	D	F#	G	A	G#		
I	F	E	A#	C#	B	D#			D	F#	G	A	G#	C		
II	E	A#	C#	B	D#	F			F#	G	A	G#	C	D		
III	A#	C#	B	D#	F	E			G	A	G#	C	D	F#		
IV	C#	B	D#	F	E	A#			A	G#	C	D	F#	G		
V	B	D#	F	E	A#	C#			G#	C	D	F#	G	A		

	γ							δ								
	D#	F	E	A#	C#	B			C	D	F#	G	A	G#		
I	D#	D	G#	B	A	C#			C	E	F	G	F#	A#		
II	D#	A	C	A#	D#	F			C	C#	D#	D	F#	G#		
III	D#	F#	E	G#	A#	A			C	D	C#	F	G	B		
IV	D#	C#	F	G	F#	C			C	B	D#	F	A	A#		
V	D#	G	A	G#	D	F			C	E	F#	A#	B	C#		

III. Rotational Arrays for *Abraham and Isaac* (1963)

Prime (P)														
Intervals:	α						β							
	<	1	10	10	1	8	(6)>	<	10	1	2	2	1	(8)>
	F	F#	E	D	D#	B		A	G	G#	A#	C	C#	
I	F#	E	D	D#	B	F		G	G#	A#	C	C#	G	
II	E	D	D#	B	F	F#		G#	A#	C	C#	G	G	
III	D	D#	B	F	F#	E		A#	C	C#	G	G	G#	
IV	D#	B	F	F#	E	D		C	C#	G	G	G#	A#	
V	B	F	F#	E	D	D#		C#	G	G	G#	A#	C	
Intervals:	γ						δ							
	F	F#	E	D	D#	B		A	G	G#	A#	C	C#	
I	F	D#	C#	D	A#	E		A	A#	C	D	D#	B	
II	F	D#	E	C	F#	G		A	B	C#	D	A#	G#	
III	F	F#	D	G#	A	G		A	B	C	G#	F#	G	
IV	F	C#	G	G#	F#	E		A	A#	F#	E	F	G	
V	F	B	C	A#	G#	A		A	F	D#	E	F#	G#	
Inversion (I)														
Intervals:	α						β							
	<	11	2	2	11	4	(6)>	<	2	11	10	10	11	(4)>
	F	E	F#	G#	G	B		C#	D#	D	C	A#	A	
I	E	F#	G#	G	B	F		D#	D	C	A#	A	C#	
II	F#	G#	G	B	F	E		D	C	A#	A	C#	D#	
III	G#	G	B	F	E	F#		C	A#	A	C#	D#	D	
IV	G	B	F	E	F#	G#		A#	A	C#	D#	D	C	
V	B	F	E	F#	G#	G		A	C#	D#	D	C	A#	
Intervals:	γ						δ							
	F	E	F#	G#	G	B		C#	D#	D	C	A#	A	
I	F	G	A	G#	C	F#		C#	C	A#	G#	G	B	
II	F	G	F#	A#	E	D#		C#	B	A	G#	C	D	
III	F	E	G#	D	C#	D#		C#	B	A#	D	E	D#	
IV	F	A	D#	D	E	F#		C#	C	E	F#	F	D#	
V	F	B	A#	C	D	C#		C#	F	G	F#	E	D	

(continued)

Rotation Arrays for *Abraham and Isaac* (1963) continued

Retrograde (R)

	α						β							
Intervals:	<	11	10	10	11	2	(4)>	<	4	11	2	2	11	(6)>
	C#	C	A#	G#	G	A		B	D#	D	E	F#	F	
I	C	A#	G#	G	A	C#		D#	D	E	F#	F	B	
II	A#	G#	G	A	C#	C		D	E	F#	F	B	D#	
III	G#	G	A	C#	C	A#		E	F#	F	B	D#	D	
IV	G	A	C#	C	A#	G#		F#	F	B	D#	D	E	
V	A	C#	C	A#	G#	G		F	B	D#	D	E	F#	

	γ						δ							
	C#	C	A#	G#	G	A		B	D#	D	E	F#	F	
I	C#	B	A	G#	A#	D		B	A#	C	D	C#	G	
II	C#	B	A#	C	E	D#		B	C#	D#	D	G#	C	
III	C#	C	D	F#	F	D#		B	C#	C	F#	A#	A	
IV	C#	D#	G	F#	E	D		B	A#	E	G#	G	A	
V	C#	F	E	D	C	B		B	F	A	G#	A#	C	

Inversion of the Retrograde (IR)

	α						β							
Intervals:	<	1	2	2	1	10	(8)>	<	8	1	10	10	1	(6)>
	C#	D	E	F#	G	F		D#	B	C	A#	G#	A	
I	D	E	F#	G	F	C#		B	C	A#	G#	A	D#	
II	E	F#	G	F	C#	D		C	A#	G#	A	D#	B	
III	F#	G	F	C#	D	E		A#	G#	A	D#	B	C	
IV	G	F	C#	D	E	F#		G#	A	D#	B	C	A#	
V	F	C#	D	E	F#	G		A	D#	B	C	A#	G#	

	γ						δ							
	C#	D	E	F#	G	F		D#	B	C	A#	G#	A	
I	C#	D#	F	F#	E	C		D#	E	D	C	C#	G	
II	C#	D#	E	D	A#	B		D#	C#	B	C	F#	D	
III	C#	D	C	G#	A	B		D#	C#	D	G#	E	F	
IV	C#	B	G	G#	A#	C		D#	E	A#	F#	G	F	
V	C#	A	A#	C	D	D#		D#	A	F	F#	E	D	

(continued)

Rotation Arrays for *Abraham and Isaac* (1963) concluded

Retrograde Inversion (RI)

	α						β							
Intervals:	<	1	2	2	1	10	(8)>	<	8	1	10	10	1	(6)>
	A	A#	C	D	D#	C#		B	G	G#	F#	E	F	
I	A#	C	D	D#	C#	A		G	G#	F#	E	F	B	
II	C	D	D#	C#	A	A#		G#	F#	E	F	B	G	
III	D	D#	C#	A	A#	C		F#	E	F	B	G	G#	
IV	D#	C#	A	A#	C	D		E	F	B	G	G#	F#	
V	C#	A	A#	C	D	D#		F	B	G	G#	F#	E	
	γ						δ							
	A	A#	C	D	D#	C#		B	G	G#	F#	E	F	
I	A	B	C#	D	C	G#		B	C	A#	G#	A	D#	
II	A	B	C	A#	F#	G		B	A	G	G#	A	D#	
III	A	A#	G#	E	F	G		B	A	A#	E	C	C#	
IV	A	G	D#	E	F#	G#		B	C	F#	D	D#	C#	
V	A	F	F#	G#	A#	B		B	F	C#	D	C	A#	

IV. Rotation Arrays for *Requiem Canticles* (1966)
Series I

		Prime (P)													
		α						β							
Intervals:	<	2	8	1	2	7	(4)	>	<	1	2	7	11	2	(1)>
		F	G	D#	E	F#	C#		B	C	D	A	G#	A#	
I		G	D#	E	F#	C#	F		C	D	A	G#	A#	B	
II		D#	E	F#	C#	F	G		D	A	G#	A#	B	C	
III		E	F#	C#	F	G	D#		A	G#	A#	B	C	D	
IV		F#	C#	F	G	D#	E		G#	A#	B	C	D	A	
V		C#	F	G	D#	E	F#		A#	B	C	D	A	G#	
		γ						δ							
		F	G	D#	E	F#	C#		B	C	D	A	G#	A#	
I		F	C#	D	E	B	D#		B	C#	G#	G	A	A#	
II		F	F#	G#	D#	G	A		B	F#	F	G	G#	A	
III		F	G	D	F#	G#	E		B	A#	C	C#	D	E	
IV		F	C	E	F#	D	D#		B	C#	D	D#	F	C	
V		F	A	B	G	G#	A#		B	C	C#	D#	A#	A	

		Inversion (I)													
		α						β							
Intervals:	<	10	4	11	10	5	(8)	>	<	11	10	5	1	10	(11)>
		F	D#	G	F#	E	A		B	A#	G#	C#	D	C	
I		D#	G	F#	E	A	F		A#	G#	C#	D	C	B	
II		G	F#	E	A	F	D#		G#	C#	D	C	B	A#	
III		F#	E	A	F	D#	G		C#	D	C	B	A#	G#	
IV		E	A	F	D#	G	F#		D	C	B	A#	G#	C#	
V		A	F	D#	G	F#	E		C	B	A#	G#	C#	D	
		γ						δ							
		F	D#	G	F#	E	A		B	A#	G#	C#	D	C	
I		F	A	G#	F#	B	G		B	A	D	D#	C#	C	
II		F	E	D	G	D#	C#		B	E	F	D#	D	C#	
III		F	D#	G#	E	D	F#		B	C	A#	A	G#	F#	
IV		F	A#	F#	E	G#	G		B	A	G#	G	F	A#	
V		F	C#	B	D#	D	C		B	A#	A	G	C	C#	

(continued)

Rotation Arrays for *Requiem Canticles* (1966), Series I concluded

Retrograde (R)

	α							β								
Intervals:	<	10	1	5	10	11	(11)	>	<	5	10	11	4	10	(8)	>
	A#	G#	A	D	C	B			C#	F#	E	D#	G	F		
I	G#	A	D	C	B	A#			F#	E	D#	G	F	C#		
II	A	D	C	B	A#	G#			E	D#	G	F	C#	F#		
III	D	C	B	A#	G#	A			D#	G	F	C#	F#	E		
IV	C	B	A#	G#	A	D			G	F	C#	F#	E	D#		
V	B	A#	G#	A	D	C			F	C#	F#	E	D#	G		

	γ							δ								
	A#	G#	A	D	C	B			C#	F#	E	D#	G	F		
I	A#	B	E	D	C#	C			C#	B	A#	D	C	G#		
II	A#	D#	C#	C	B	A			C#	C	E	D	A#	D#		
III	A#	G#	G	F#	E	F			C#	F	D#	B	E	D		
IV	A#	A	G#	F#	G	C			C#	B	G	C	A#	A		
V	A#	A	G	G#	C#	B			C#	A	D	C	B	D#		

Inversion of the Retrograde (IR)

	α							β								
Intervals:	<	2	11	7	2	1	(1)	>	<	7	2	1	8	2	(4)	>
	A#	C	B	F#	G#	A			G	D	E	E#	C#	D#		
I	C	B	F#	G#	A	A#			D	E	E#	C#	D#	G		
II	B	F#	G#	A	A#	C			E	E#	C#	D#	G	D		
III	F#	G#	A	A#	C	B			E#	C#	D#	G	D	E		
IV	G#	A	A#	C	B	F#			C#	D#	G	D	E	E#		
V	A	A#	C	B	F#	G#			D#	G	D	E	E#	C#		

	γ							δ								
	A#	C	B	F#	G#	A			G	D	E	E#	C#	D#		
I	A#	A	E	F#	G	G#			G	A	A#	F#	G#	C		
II	A#	F	G	G#	A	B			G	G#	E	F#	A#	E#		
III	A#	C	C#	D	E	D#			G	D#	E#	A	E	F#		
IV	A#	B	C	D	C#	G#			G	A	C#	G#	A#	B		
V	A#	B	C#	C	G	A			G	B	F#	G#	A	E#		

V. Rotational Arrays *Requiem Canticles* (1966)
Series II

Prime (P)																
α							β									
Intervals:	<	7	11	10	1	4	(3)	>	<	2	5	10	10	3	(6)	>
	F	C	B	A	A#	D			C#	D#	G#	F#	E	G		
I	C	B	A	A#	D	F			D#	G#	F#	E	G	C#		
II	B	A	A#	D	F	C			G#	F#	E	G	C#	D#		
III	A	A#	D	F	C	B			F#	E	G	C#	D#	G#		
IV	A#	D	F	C	B	A			E	G	C#	D#	G#	F#		
V	D	F	C	B	A	A#			G	C#	D#	G#	F#	E		

γ							δ									
	F	C	B	A	A#	D			C#	D#	G#	F#	E	G		
I	F	E	D	D#	G	A#			C#	F#	E	D	F	B		
II	F	D#	E	G#	B	F#			C#	B	A	C	F#	G#		
III	F	F#	A#	C#	G#	G			C#	B	D	G#	A#	D#		
IV	F	A	C	G	F#	E			C#	E	A#	C	F	D#		
V	F	G#	D#	D	C	C#			C#	G	A	D	C	A#		

Inversion (I)																
α							β									
Intervals:	<	5	1	2	11	8	(9)	>	<	10	7	2	2	9	(6)	>
	F	A#	B	C#	C	G#			A	G	D	E	F#	D#		
I	A#	B	C#	C	G#	F			G	D	E	F#	D#	A		
II	B	C#	C	G#	F	A#			D	E	F#	D#	A	G		
III	C#	C	G#	F	A#	B			E	F#	D#	A	G	D		
IV	C	G#	F	A#	B	C#			F#	D#	A	G	D	E		
V	G#	F	A#	B	C#	C			D#	A	G	D	E	F#		

γ							δ									
	F	A#	B	C#	C	G#			A	G	D	E	F#	D#		
I	F	F#	G#	G	D#	C			A	E	F#	G#	F	B		
II	F	G	F#	D	B	E			A	B	C#	A#	E	D		
III	F	E	C	A	D	D#			A	B	G#	D	C	G		
IV	F	C#	A#	D#	E	F#			A	F#	C	A#	F	G		
V	F	D	G	G#	A#	A			A	D#	C#	G#	A#	C		

(continued)

Rotation Arrays for *Requiem Canticles* (1966), Series II concluded

Retrograde (R)

	α								β						
Intervals:	<	9	2	2	7	10	(6)	>	<	8	11	2	1	5	(9)>
	G	E	F#	G#	D#	C#		D	A#	A	B	C	F		
I	E	F#	G#	D#	C#	G		A#	A	B	C	F	D		
II	F#	G#	D#	C#	G	E		A	B	C	F	D	A#		
III	G#	D#	C#	G	E	F#		B	C	F	D	A#	A		
IV	D#	C#	G	E	F#	G#		C	F	D	A#	A	B		
V	C#	G	E	F#	G#	D#		F	D	A#	A	B	C		

	γ								δ						
	G	E	F#	G#	D#	C#		D	A#	A	B	C	F		
I	G	A	B	F#	E	A#		D	C#	D#	E	A	F#		
II	G	A	E	D	G#	F		D	E	F	A#	G	D#		
III	G	D	C	A#	D#	F		D	D#	G#	F	C#	C		
IV	G	F	B	G#	A#	C		D	G	E	C	B	C#		
V	G	C#	A#	C	D	A		D	B	G	F#	G#	A		

Inversion of the Retrograde (IR)

	α								β						
Intervals:	<	3	10	10	5	2	(6)	>	<	4	1	10	11	7	(3)>
	G	A#	G#	F#	B	C#		C	E	F	D#	D	A		
I	A#	G#	F#	B	C#	G		E	F	D#	D	A	C		
II	G#	F#	B	C#	G	A#		F	D#	D	A	C	E		
III	F#	B	C#	G	A#	G#		D#	D	A	C	E	F		
IV	B	C#	G	A#	G#	F#		D	A	C	E	F	D#		
V	C#	G	A#	G#	F#	B		A	C	E	F	D#	D		

	γ								δ						
	G	A#	G#	F#	B	C#		C	E	F	D#	D	A		
I	G	F	D#	G#	A#	E		C	C#	B	A#	F	G#		
II	G	F	A#	C	F#	A		C	A#	A	E	G	B		
III	G	C	D	G#	B	A		C	B	F#	A	C#	D		
IV	G	A	D#	F#	E	D		C	G	A#	D	D#	C#		
V	G	C#	E	D	C	F		C	D#	G	G#	F#	F		

VITA

Robert Sivy was born in Sewickley, Pennsylvania. At age 10 he began his musical studies in the saxophone, and at age 14 began playing the clarinet and violin. From 1998 to 2003 he attended Geneva College, a Christian liberal arts college located in Beaver Falls, Pennsylvania, where he earned a Bachelor of Science in music education and Bachelor of Arts in violin performance. In 2011 Robert earned a Master of Music in music theory from the University of Tennessee at Knoxville. He resides in Knoxville with his wife, Katherine and their son Michael.