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Dual-Interval Spaces: Interrelations Between Interval Classes 1 and 5, Local Pitch Centers and Form in Dmitri Shostakovich's Piano Sonata No. 1, Op. 12

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DUAL-INTERVAL SPACES: INTERRELATIONS BETWEEN INTERVAL
CLASSES 1 AND 5, LOCAL PITCH CENTERS AND FORM IN DMITRI
SHOSTAKOVICH'S PIANO SONATA NO. 1, OP. 12.

by

Tae Young Hong

A Thesis
Submitted to the Graduate School
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Master of Music

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ABSTRACT

DUAL-INTERVAL SPACES: INTERRELATIONS BETWEEN INTERVAL CLASSES 1 AND 5, LOCAL PITCH CENTERS AND FORM IN DMITRI SHOSTAKOVICH'S PIANO SONATA NO. 1, OP. 12.

by Tae Young Hong

December 2015

Dmitri Shostakovich's *Piano Sonata No. 1*, written in 1926, is one of his most complex and lengthy works for piano. In contrast to the conservative style used in his critically-acclaimed *Symphony No. 1, Op. 10*, composed a year earlier, the sonata employs a highly modernistic idiom which predominated the composer's output in the late 1920's. The musical surface of the sonata was crafted by an extensive use of interval classes 1 and 5 which serve as the primary means of structuring pitch material.

This paper examines the surface combinations of two interval classes as well as their interaction with the structure through composing out, using Stephen Brown's Dual Interval Space (DIS), a two-dimensional tonnetz. The DIS provides a tool that delineates both the voice-leading space of interval classes 1 and 5 and the relationship among different set classes that consist of them. This paper will build upon Brown's discovery by demonstrating how intervallic properties from these short excerpts are composed out on a large scale as pitch centers—leading to a new understanding of the role that the two interval classes play in this sonata, both locally and structurally.

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CHAPTER I

INTRODUCTION

Dmitri Shostakovich's *Piano Sonata No. 1*, written in 1926, is one of his most complex and lengthy works for piano. In contrast to the more conservative style of the critically-acclaimed *First Symphony* composed a year earlier, the sonata employs a highly modernistic idiom, which predominated the composer's output in the late 1920's. Along with *Aphorisms* and the *Second Symphony* of this period, the sonata's unrelenting energy and radical style exemplifies the composer at his most experimental.

Despite its significance as one of the earliest examples of Shostakovich's period of experimental language and as a display of his compositional tools, little analytical attention has been given to the sonata. Although a small number of dissertations and articles have described the form and examined short excerpts, no detailed analysis of the sonata exists that thoroughly examines the pitch structure and its interaction with the form. The sonata is also an example of the synthesis between Shostakovich's two characteristic harmonic idioms: the motivic interaction of interval classes 1 and 5, and the C diatonicism which he often employed--especially in some of his late works¹. This thesis aims at investigating the various functions and symmetry of the two interval classes that dictate the primary motion in the surface as well as their larger-scale composing-out, and their relationship to local centricity and formal structure.

¹ Brown, Stephen. "ic1/ic5 Interaction in the Music of Shostakovich." in *Music Analysis* 28/2-3 (July 2009): 185

Hans Keller and Laurel Fay also have noted the simultaneous occurrences of minor seconds and perfect fourths. See Hans Keller, "Shostakovich's Twelfth Quartet." in *Tempo* 94 (1940): 12. and Laurel Fay "Musorgsky and Shostakovich." in *Musorgsky: in Memoriam, 1881-1981*, edited by Malcolm Hamrick Brown. Ann Arbor, MI: UMI Research Press, 1982: 222.

The Five Creative Periods of Shostakovich

David Fanning, in his *New Grove* article, groups the creative output of Shostakovich into five distinct style periods: an early period, an experimental period, a period of official censure, a period that coincides with the cultural movement that took place after Stalin's death (known as "the thaw"²), and a late period. Style historiographies similar to this are published in the *New Grove* article on Shostakovich³ and in Laurel Fay's well-known biography.⁴ Yet in all of the periods described above, the music of Shostakovich often displays conflicting stylistic characteristics, perhaps due to the complex nature of his personality. His musical style eludes uniformity, often times displaying aspects of both conservatism and avant-garde. This phenomenon, known as "the two Shostakoviches" can be observed as early as the *Second Symphony*, which juxtaposes abstract and confrontational instrumental writing with mass song style.⁵ This dualism became even more marked after 1936 when Stalin's communist Russia condemned Shostakovich's music as 'formalist' and against the communist ideals. His fall from the favor of the communist party, brought about by Stalin's scathing review of his opera, *Lady Macbeth of the Mtsensk District*, left the composer in a vulnerable position in which his artistic goals needed to change for the sake of preserving his own safety. This dichotomy between the 'official' Shostakovich who faced immense pressure from above and the 'artistic' Shostakovich who was intrigued by new music from the west becomes evident, especially after 1936. However, this duality also can be observed

² Fanning, David. "Dmitri Shostakovich." In *The New Grove Dictionary of Music and Musicians*, edited by Stanley Sadie and John Tyrell. 2nd ed. New York: Oxford University Press, 2001.

³ Ibid

⁴ Fay, Laurel. *Shostakovich: A Life*. Oxford: Oxford University Press, 2000.

⁵ Fanning, David. "Dmitri Shostakovich." In *The New Grove Dictionary of Music and Musicians*, edited by Stanley Sadie and John Tyrell. 2nd ed. New York: Oxford University Press, 2001.

in his music before the official denunciation as well. The first two style periods, the early period leading up to the *First Symphony* and the experimental period of the *Second Symphony* and the *First Sonata* demonstrate significant stylistic contrast within each piece. This study primarily focuses on the second period in particular, during which modernistic style predominated the composer's output albeit with fleeting moments where the influence of tonal centrality can be heard.

As noted above, the ten years between the success of his *First Symphony* (1926) and the denunciation of his music by the communist party (1936) marked a period of experimentation for the composer. His output during this period--including the *Second Symphony*, *Aphorisms*, his first opera *The Nose*, and the *First Piano Sonata*--displays the influence of avant-garde ideas imported from the west. During this period, a conglomeration of several influences also shaped his writing, including the linear counterpoint of Krenek and Hindemith, and the modernistic and virtuosic writing of Prokofiev.⁶ The *Piano Sonata No. 1*, therefore, instantiates Shostakovich's most modernistic writing for the instrument, apart from the *Aphorisms* that followed. However, the sonata still pays tribute to traditional structure by juxtaposing various tonal devices in significant moments.

Neo-Tonality

The coexistence of tonal structures and post-tonal motivic structures within the same piece, as one may hear in Shostakovich's *Piano Sonata No. 1*, has been described recently by music theorists by a new term: neo-tonality. The term encompasses the

⁶ Fanning, David. "Dmitri Shostakovich." In *The New Grove Dictionary of Music and Musicians*, edited by Stanley Sadie and John Tyrell. 2nd ed. New York: Oxford University Press, 2001.

music of such composers as Britten, Prokofiev, and Stravinsky and others.⁷ These works feature both characteristics of tonality (triads, tonal centers, diatonicism, functional harmony, etc.) and atonality (non-tertian pitch structures, lack of common-practice voice-leading, pitch organization based on the extensive use of set-class relations such as subset/superset relations, complementation, etc.).⁸ The analysis of neo-tonal music has often proved problematic for theorists largely due to the fact that the material often exhibits multiple stylistic tendencies, thus it cannot be sufficiently explained by a single method of analysis.

The modernistic language Shostakovich used in *Piano Sonata Op. 12* eludes a strong sense of tonality for the vast majority of the piece. The main referential collection is the chromatic scale, and semitones function as the ultimate source of horizontal motion. The pervasive semitone motion and linear counterpoint within the symmetric chromatic scale, therefore, blur the distinction between consonance and dissonance, or tension and release, a crucial criterion for tonal music. However, references to tonality do occur in the sonata in juxtaposition with the chromaticism, primarily in the form of the C diatonic collection and salient triads at structural points. These referential pitches become salient through various means, delineating the structure and providing aural anchors amid acrid dissonances. Therefore, the sonata is an example of the dualism, between tonality and atonality, between conservative and avant-garde, in the musical characteristics of Shostakovich despite being one of his most ‘atonal’ works.

⁷ Silberman, Peter. “Neighbor Spaces: A Theory of Harmonic Embellishment for Twentieth-Century Neotonal Music.” Ph.D. diss., University of Rochester, 2006.

⁸ Ibid.

CHAPTER II

DUAL-INTERVAL SPACE

In analyzing the pitch material in specific passages of Shostakovich, Schoenberg, Webern, and others, Stephen Brown devised a Dual Interval Space (DIS) that can be modeled using a two-dimensional diagram. The DIS provides a tool that delineates two structural phenomena that are important to the analysis of Shostakovich's *Sonata No. 1*: (1) the voice-leading space formed by the interaction of interval classes 1 and 5, and (2) the relationship among different set classes that consist of these interval classes.

The DIS is constructed by aligning two different interval classes on each axis of a two dimensional grid. For example, a DIS utilizing interval classes 1 and 5 where interval class 1 occupies the x-axis, and interval class 5 the y axis is referred to as "ic1/ic5 space."⁹ A total of fifteen different combinations of distinct interval classes are possible¹⁰, therefore fifteen distinct DIS diagrams can be created as well. The DIS serves as a useful analytical technique in certain contexts of post-tonal music, in which two interval classes are predominantly featured on the musical surface, thus allowing the pitch material to move through the grid vertically or horizontally. When choosing the orientation of the grid, one must consider the function of the interval classes in the passage being analyzed. Due to the system of musical notation which assigns the vertical harmony in the y-axis and the melody in the x-axis, the grid assumes a more natural position when these ingrained tendencies are considered. In the case of Shostakovich's *Sonata No. 1*, the interval class 1 primarily dictates the horizontal movement whereas interval class 5 often

⁹ Brown, Stephen. "Dual Interval Space in Twentieth-Century Music." in *Music Theory Spectrum* 25/1 (Spring 2003): 35-57.

¹⁰ Given the cardinality n, this number is determined as the sum of all positive integers less than or equal to n.

occurs in the vertical as supporting harmony, therefore, the DIS assumes the orientation represented in the following figure.

F#/Gb	G	G#/Ab	A	A#/Bb	B	C
B	C	C#/Db	D	D#/Eb	E	F
E	F	F#/Gb	G	G#/Ab	A	A#/Bb
A	A#/Bb	B	C	C#/Db	D	D#/Eb
D	D#/Eb	E	F	F#/Gb	G	G#/Ab
G	G#/Ab	A	A#/Bb	B	C	C#/Db
C	C#/Db	D	D#/Eb	E	F	F#/Gb
F	F#/Gb	G	G#/Ab	A	A#/Bb	B

Example 1. ic1/ic5 DIS. Interval class 1 occupies the x-axis and interval class 5 the y-axis

Here, the letter inside each grid represents a pitch class. The interval class 1 traverses the X axis in ascending order, such as F, F#, G etc., and the interval class 5 the Y axis. Motion utilizing these two interval classes, therefore, moves either horizontally or vertically through the space.

Operations on the DIS

Various operations are possible in the DIS: transposition, partial inversion, full inversion, and interval exchange. In order to elucidate these mappings, however, a system of designating locations on the DIS is necessary. The labeling utilizes a location arbitrarily chosen as the point of reference. Then, the other locations on the grid are labeled in respect to this origin in an ordered pair such as (a, b) in which a represents the

distance from the origin on the x-axis, and b the distance on the y-axis. Transposition on the DIS involves a very simple operation. Given the transposition operator $T(i, j)$ and a location (a, b) , the operation involves simple addition; $T(i, j)(a, b) = (a+i, b+j)$. In other words, the operation would move the location i spaces to the right and j spaces up¹¹.

An instance of transposition within the DIS is demonstrated in Example 2. Here, the two (016) trichords at measures 5 and 6 are mapped on the ic1/ic5 space. The two pc sets assume identical shape in the graph and are displaced on the x-axis. The F that is highlighted in the DIS has been chosen arbitrarily as the point of reference so that the x and y coordinates can be given to each pitch in the space. Assuming F is (0, 0), the G# of the first trichord is given the coordinate (1, 2) which maps on to the B of the second trichord at (4, 2) through the operator $T(3, 0)$.

Inversions on the DIS, however, require a slightly more complicated formula. There are several types of inversions possible: partial inversion about a vertical axis, partial inversion about a horizontal axis, and full inversion which combines the two operations. The operator for inversion is $I(m, n)$ in which m represents the sum of the x-coordinates between any two locations that are related by inversion, and n the sum of the y-coordinates. Therefore, $I(m, _)$ inverts the location around the axis $x=m/2$.¹²

¹¹ Brown, Stephen. "Dual Interval Space in Twentieth-Century Music." in *Music Theory Spectrum* 25/1 (Spring 2003): 35-57.

¹² Brown, Stephen. "Dual Interval Space in Twentieth-Century Music." in *Music Theory Spectrum* 25/1 (Spring 2003): 35-57.

Musical score showing a sequence of notes: G#, D, A, B, F, C. The notes are grouped into two sets: {G#, D, A} and {B, F, C}.

C#/Db	D	D#/Eb	E	F	F#/Gb	G	G#/Ab
F#/Gb	G	G#/Ab	A	A#/Bb	B	C	C#/Db
B	C	C#/Db	D	D#/Eb	E	F	F#/Gb
E	F	F#/Gb	G	G#/Ab	A	A#/Bb	B
A	A#/Bb	B	C	C#/Db	D	D#/Eb	E

Ordered pair mapping	Effect on pitch classes
$T_{(3,0)}(1,2) = (4,2)$	$Ab \rightarrow B$
$T_{(3,0)}(2,2) = (5,2)$	$A \rightarrow C$
$T_{(3,0)}(2,1) = (5,1)$	$D \rightarrow F$

Example 2. Shostakovich, Piano Sonata No. 1, Op. 12: 5-6. Transposition of (016) trichord.

C# G F# Ab E D#

E	F	F#/Gb	G	G#/Ab	A	A#/Bb	B	C	C#/Db
A	A#/Bb	B	C	D#/Eb	E	D#/Eb	E	F	F#/Gb
D	D#/Eb	E	F	G#/Ab	A	G#/Ab	A	A#/Bb	B
G	G#/Ab	A	A#/Bb	C#/Db	D	C#/Db	D	D#/Eb	E
C	C#/Db	D	D#/Eb	F#/Gb	G	F#/Gb	G	G#/Ab	A
F	F#/Gb	G	G#/Ab	A	A#/Bb	B	C	C#/Db	D

Ordered pair mapping	Effect on pitch classes
$I_{(-,3)}(2,0) = (2,3)$	$C\# \rightarrow G\#$
$I_{(-,3)}(2,1) = (2,2)$	$F\# \rightarrow D\#$
$I_{(-,3)}(3,0) = (3,3)$	$G \rightarrow E$

Example 3. Shostakovich, Piano Sonata No. 1, Op. 12: 100-101. Inversion that relates (015) and (016) trichords.

The last operation on the DIS, the interval exchange, involves flipping around a diagonal axis. The operator, E_n , indicates a flipping about the main diagonal axis which moves the location n spaces to the right of the origin. E'_n , on the other hand, flips the

location about the secondary diagonal. The interval exchange operation can be summarized as $E_n(a, b) = (b+n, a-n)$, while $E'_n(a, b) = (n-b, n-a)$.

C#/Db	D	D#/Eb	E	F	F#/Gb	G	G#/Ab	A
F#/Gb	G	G#/Ab	A	A#/Bb	B	C	C#/Db	D
B	C	C#/Db	D	D#/Eb	E	F	F#/Gb	G
E	F	F#/Gb	G	G#/Ab	A	A#/Bb	B	C
A	A#/Bb	B	C	C#/Db	D	D#/Eb	E	F
D	D#/Eb	E	F	F#/Gb	G	G#/Ab	A	A#/Bb
G	G#/Ab	A	A#/Bb	B	C	C#/Db	D	D#/Eb
C	C#/Db	D	D#/Eb	E	F	F#/Gb	G	G#/Ab
F	F#/Gb	G	G#/Ab	A	A#/Bb	B	C	C#/Db

Ordered pair mapping	Effect on pitch class
$E'_3(0, -2) = (5, 3)$	$G\# \rightarrow C$
$E'_3(0, -3) = (6, 3)$	$C\# \rightarrow C\#$
$E'_3(1, -3) = (6, 2)$	$D \rightarrow F\#$
$E'_3(2, -3) = (6, 1)$	$E\flat \rightarrow B$
$E'_3(3, -3) = (6, 0)$	$E \rightarrow E$

Example 4. Interval exchange between trichord (0127) and (0157)

The DIS also has an advantage over the traditional pc set analysis in passages where two interval classes are featured prominently. Different pc sets that are constructed by combining two interval classes can be related to each other on the DIS. While transposition and full inversion (flipping about both axis) does not affect the interval content of the original pc set, partial inversion (flipping about one axis) and interval exchange (flipping about a diagonal axis) map the original pc set into a different one. The latter operations therefore elucidate the relationship between two closely related sets that pc set analysis does not reveal.

Example 5 presents an example of a partial inversion showing the relationship between two different set classes on the DIS. Given the origin $D\#$ in double-border, the two tetrachords relate to each other by $I(6, 0)$ about a vertical axis which passes through $(3, 0)$. The tetrachord on the left of the axis consists of pitch classes D, G, C and B, a member of pc set 4-14 (0237). Its inversion, pitch classes E, A, D, and $D\#$, however, form pc set 4-6 (0127). Despite the similarity of their construction, pc set analysis fails to recognize the close relationship between the two; the two sets are built by attaching a semitone above or below trichord 3-9 (027).

The four possible operations on the DIS serve as a useful analytical tool in the sonata. The extensive use of interval classes 1 and 5 in both the horizontal and vertical dimensions inevitably creates sets that are constructed with similar intervals but may not represent the same pc set. Throughout the sonata, Shostakovich utilizes different combinations of the two interval classes to create sets of varying cardinality. The relationship between these sets is best explained by studying their construction rather than the intervallic content. The DIS illuminates such relationships while providing a

visual guide that reveals the level of symmetry between the sets. The next chapter will discuss the specific ways Shostakovich uses the two main intervals in the sonata and observe the variety of relationships illustrated by the DIS.

G#/Ab	A	A#/Bb	B	C	C#/Db	D	D#/Eb	E
C#/Db	D	D#/Eb	E	F	F#/Gb	G	G#/Ab	A
F#/Gb	G	G#/Ab	A	A#/Bb	B	C	C#/Db	D
B	C	C#/Db	D	D#/Eb	E	F	F#/Gb	G
E	F	F#/Gb	G	G#/Ab	A	A#/Bb	B	C
A	A#/Bb	B	C	C#/Db	D	D#/Eb	E	F
D	D#/Eb	E	F	F#/Gb	G	G#/Ab	A	A#/Bb
G	G#/Ab	A	A#/Bb	B	C	C#/Db	D	D#/Eb
C	C#/Db	D	D#/Eb	E	F	F#/Gb	G	C

Example 5. Pc sets 4-6 and 4-14 related by partial inversion on the DIS

CHAPTER III

INTERVAL FUNCTION AND USE OF INTERVAL CLASSES 1 AND 5

The foremost organizing principle of the *Piano Sonata, Op.12*, is the use of interval classes 1 and 5. Analysis of its application can shed important light on not only the surface logic of the piece, but also the underlying structure. The prominence of the two interval classes in the music of Shostakovich has been observed by several authors, including Stephen Brown,¹³ Laurel E. Fay,¹⁴ Hans Keller, Denise Elshoff,¹⁵ and Ling-Yu Kan¹⁶. Although this feature is more pronounced in his later works, *Piano Sonata, Op. 12* constitutes one of the earliest examples of its use. The two intervals, semitone and perfect fourth, and their inversions intertwine throughout the sonata and provide the basis for melodic and harmonic motion.

Although interval classes 1 and 5 dominate the pitch space, other intervals also play supporting roles. Although intervals of thirds and sixths are extremely rare in the horizontal, they become prominent in the vertical, especially at structural moments in the sonata. The interval of major third, especially, often creates vertical color underneath the melody. Passages, such as the arrival of C major triad at m. 22, provide examples of sequences of thirds providing color (Example 6). The major third also is emphasized at several structural junctures through relative duration or dynamic accents, offering a glimpse of tonality.

¹³ Brown, Stephen. "ic1/ic5 Interaction in Shostakovich." in *Music Analysis* 28/2-3 (July-October 2009): 185-220.

¹⁴ Fay, Laurel. *Shostakovich: A Life*. Oxford: Oxford University Press, 2000.

¹⁵ Elshoff, Denise. "Melody, Counterpoint, and Tonality in Shostakovich's String Quartets nos. 1-8." Ph.D. diss., Yale University, 2008.

¹⁶ Kan, Ling-Yu. "The Significance of Dmitri Shostakovich's Piano Sonata Op. 12." D.M.A diss., University of North Texas, 2007.

Example 6. Shostakovich, Piano Sonata No. 1, Op. 12: 19-23. Sequences of thirds providing color underneath the melodic idea.

The tritone also serves a similar function, often creating the vertical sonority underneath the main melodic material. It often is used in conjunction with a perfect fourth creating trichord (016) which plays a significant role in the sonata. Linearly, the tritone also serves as the interval of choice for transposing motives, especially in the exposition. The transposition at T6 also connects the salient pitches in the middleground which will be discussed in a later chapter.

The dominance of the two interval classes, 1 and 5, is most clearly characterized in the exposition and sections developing the P theme. In Exposition 2, Shostakovich introduces the S1 theme with motive *aa*, a descending scalar passage consisting of minor and major seconds. This new sonority contrasts heavily with the virtual lack of linear major seconds in the P theme, and is further pronounced later in the section, tainting the ic1/ic5 space. However, sequences involving interval classes 1 and 5 pervade both the

development and the recapitulation, further supporting the authenticity of interval classes 1 and 5 as the ultimate means of structuring the pitch material.

Categorization of Passages that Utilize Interval Classes 1 and 5

Musical surfaces that emphasize interval classes 1 and 5 can be mapped onto a DIS in a variety of ways. This chapter aims to demonstrate the different patterns of voice-leading within the space and take a further step of classifying the patterns that are revealed by these mappings. Such a classification will allow a critical consideration of two compositional consequences that result from the use of the two interval classes: (1) the relation of ic1/ic5 voice-leading spaces to locally salient pitches, and (2) the effect of the use of the two interval classes upon the overall form of this composition.

Passages that exhibit motion within the ic1/ic5 space in the sonata have been analyzed and placed into three categories depending on their function and relation to local salience. The first category consists of passages that show sequential movement within the space. This is the most common type, and is often found in transitory sections throughout the sonata. The next category involves passages that display some type of symmetry around a single pitch or axis. The last group involves examples that suggest salience or centrality. These passages may overlap with the second category as some symmetric passages also suggest aural salience on the pitch that serves as the conceptual center.

Voice-leading and Sequential motion within the DIS

Example 7.1. Shostakovich, Piano Sonata No. 1, Op. 12: 1-5. Saturation of interval classes 1 and 5.

F#/Gb	G	G#/Ab	A	A#/Bb	B	C	C#/Db
B	C	C#/Db	D	D#/Eb	E	F	F#/Gb
E	F	F#/Gb	G	G#/Ab	A	A#/Bb	B
A	A#/Bb	B	C	C#/Db	D	D#/Eb	E

Example 7.2. M. 1, right hand; motive *a*

D	D#/Eb	E	F	F#/Gb	G	G#/Ab	A
G	G#/Ab	A	A#/Bb	B	C	C#/Db	D
C	C#/Db	D	D#/Eb	E	F	F#/Gb	G
F	F#/Gb	G	G#/Ab	A	A#/Bb	B	C

Example 7.3. M.1, left hand; motive *c*. ic1/ic5 Pentachord.

The opening theme of the sonata clearly demonstrates the saturation of interval classes 1 and 5 in its linear construction. Other than a few instances of interval class 4, 3, and 6, interval classes 1 and 5 function as the ultimate horizontal motive, suggesting a highly chromatic and non-functional language. As the sonata unfolds, however, the two interval classes begin to assume several other roles such as defining the linear motion, creating the vertical, connecting motives on a larger scale, and outlining the local pitch center through symmetry.

The linear motion of LH at m.1 consists entirely of interval classes 1 and 5, and presents two statements of pc set (01237), inverted around A. Pc set (01237) is also lineated by the RH at mm. 1-2. At m. 5, the descending line G#, D, and A forms pc set 3-5 (016), a subset of (01237) which consists of the same interval classes.

These measures introduce two motives, *a* in the RH and *c* in the LH. The motive *c* consists entirely of interval classes 1 and 5, and thus travels through the *x* and *y* axis only in the DIS. As can be seen in the figure, the pitches of the motive in measure one are two iterations of pc set (01237), the second an inversion of the first, with A3 connecting the two sets with a semitone. This linear motion within the ic1/ic5 space and its transformation is one of the most prominent features of this sonata.

Motive *a*, on the other hand, begins with a major third between F4 and A4, but then conforms to the ic1/ic5 space, outlining a F augmented triad. This motive also exhibits serialistic quality, stating 8 notes of the chromatic scale before repeating a note.

Example 8.1. Shostakovich, Piano Sonata No. 1, Op. 12: 5-7. Transposition of (016) trichords.

D	D#/Eb	E	F	F#/Gb	G	G#/Ab
G	G#/Ab	A	A#/Bb	B	C	C#/Db
C	C#/Db	D	D#/Eb	E	F	F#/Gb
F	F#/Gb	G	G#/Ab	A	A#/Bb	B

Example 8.2. Mm. 5-6, RH. 016 trichords.

Mm. 5-6 is an example of simple transposition within the DIS. The first statement of pc set (016), G#, D, A at m. 5 is followed by another statement of the same pc set, B F and C. This operation shows up on the DIS as simple lateral movement of the figure. The first statement is also accompanied by a major third attached underneath and is displaced by intervening pitches in another voice, Eb, G#, Bb, and A. These pitches form a (0127) tetrachord, another structural set that can be constructed in the ic1/ic5 space. Other than the harmonic interval of a major third that provides additional color underneath the melody, the pitch material in this section suggest strong prevalence of interval classes 1 and 5

Example 9. Shostakovich, Piano Sonata No. 1, Op. 12: 73-76. Sequences of interval classes 1 and 5.

In this sequential passage excerpted from the end of the exposition, the saturation of interval classes 1 and 5 in both horizontal and vertical is demonstrated. Here, the RH vertically alternates the two interval classes while the voice leading also conforms to the ic1/ic5 space. The resulting tetrachord (0127) also consists of the same interval classes and is a subset of (01237) stated at the opening. The sequence is then transposed by T1 several times until the LH begins a descent by interval class 5 in the C diatonic scale. The LH, on the other hand, utilizes a half step sequence tritone, an interval formed by combining the two interval classes.

The above passages demonstrate various types of linear motions utilizing interval classes 1 and 5 on the surface of the sonata. Often, the pentachord (01237) and its subsets that consist of the two main interval classes provide the pitch material. Therefore, the surface material of the sonata can often be graphed onto the ic1/ic5 DIS visually

illustrating the voice-leading and sequential motions that occur. Certain passages, however, extend beyond displaying sequential motions and exhibit symmetry within the DIS.

Symmetry

Symmetric patterns that occur within the DIS can present new insights that pc set analysis may not. Particularly, the operations that involve partial inversion or interval exchange on the DIS can elucidate the relationship between different sets of varying cardinality that are constructed with similar intervals. The two most prominent pc sets in the sonata are trichords (016) and (015). These two sonorities often define the vertical color and melodic motion. Although pc set analysis regards them as two different entities, both can be constructed by combining interval classes 1 and 5. Example 10 demonstrates these structural characteristics of the two sets. Here, all the possible tetrachords and trichords that consist of the two interval classes are listed. The (016) trichord is constructed by attaching a minor second (interval class 1) inside a perfect fifth (interval class 5), whereas the (015) trichord contains the minor second outside the perfect fifth. The resulting trichords also contain two other interval classes that serve important harmonic functions throughout the sonata: interval class 4 (major third) and interval class 6 (tritone). Along with interval classes 1 and 5, these two often define the vertical color, often underneath the melodic line in a sequential pattern.

The image displays two musical staves. The top staff, labeled 'Tetrachords', contains four groups of four notes. Each group is enclosed in a bracket, and below each bracket is a label: (0156), (0156), (0145), and (0167). The bottom staff, labeled 'Trichords', contains four groups of three notes. Each group is enclosed in a bracket, and below each bracket is a label: (016), (016), (015), and (015). Both staves are in a key signature of one flat (B-flat) and use a treble clef.

Example 10. Pc sets formed when a chromatic neighbor embellishes one or both pitches of an interval class 5 dyad. *Elshoff.¹⁷

In addition to demonstrating the similarity of construction of the pc sets, the symmetry within the DIS can often point to another important musical parameter: the conceptual centers that often act as the local pitch center. Several passages in the sonata exhibit symmetry on the DIS around a single pitch that becomes salient through various means, functioning not only as a visual axis on the DIS, but also the aural center.

¹⁷ Elshoff, Denise. "Melody, Counterpoint, and Tonality in Shostakovich's String Quartets nos. 1-8." Ph.D. diss., Yale University, 2008: 124

Example 11.1. Shostakovich, Piano Sonata No. 1, Op. 12: 31-36. Symmetric motion within the DIS.

C#/Db	D	D#/Eb	E	F	F#/Gb	G
F#/Gb	G	G#/Ab	A	A#/Bb	B	C
B	C	C#/Db	D	D#/Eb	E	F
E	F	F#/Gb	G	G#/Ab	A	A#/Bb

Example 11.2. Mm. 31-34; LH. Sequence of (015) trichords.

E	F	F#/Gb	G	G#/Ab	A	A#/Bb
A	A#/Bb	B	C	C#/Db	D	D#/Eb
D	D#/Eb	E	F	F#/Gb	G	G#/Ab
G	G#/Ab	A	A#/Bb	B	C	C#/Db
C	C#/Db	D	D#/Eb	E	F	F#/Gb

Example 11.3. Mm. 31-32; RH. ic1/ic5 sequence

A#/Bb	B	C	C#/Db	D	D#/Eb
D#/Eb	E	F	F#/Gb	G	G#/Ab
G#/Ab	A	A#/Bb	B	C	C#/Db
C#/Db	D	D#/Eb	E	F	F#/Gb
F#/Gb	G	G#/Ab	A	A#/Bb	B
B	C	C#/Db	D	D#/Eb	E

Example 11.4. Mm. 33-34; RH. Motive *a*

F#/Gb	G	G#/Ab	A	A#/Bb	B	C	C#/Db	D	D#/Eb	E	F	F#/Gb	G
B	C	C#/Db	D	D#/Eb	E	F	F#/Gb	G	G#/Ab	A	A#/Bb	B	C
E	F	F#/Gb	G	G#/Ab	A	A#/Bb	B	C	C#/Db	D	D#/Eb	E	F
A	A#/Bb	B	C	C#/Db	D	D#/Eb	E	F	F#/Gb	G	G#/Ab	A	A#/Bb

Example 11.5. Mm. 32-34; LH. Sequence of (016) trichords

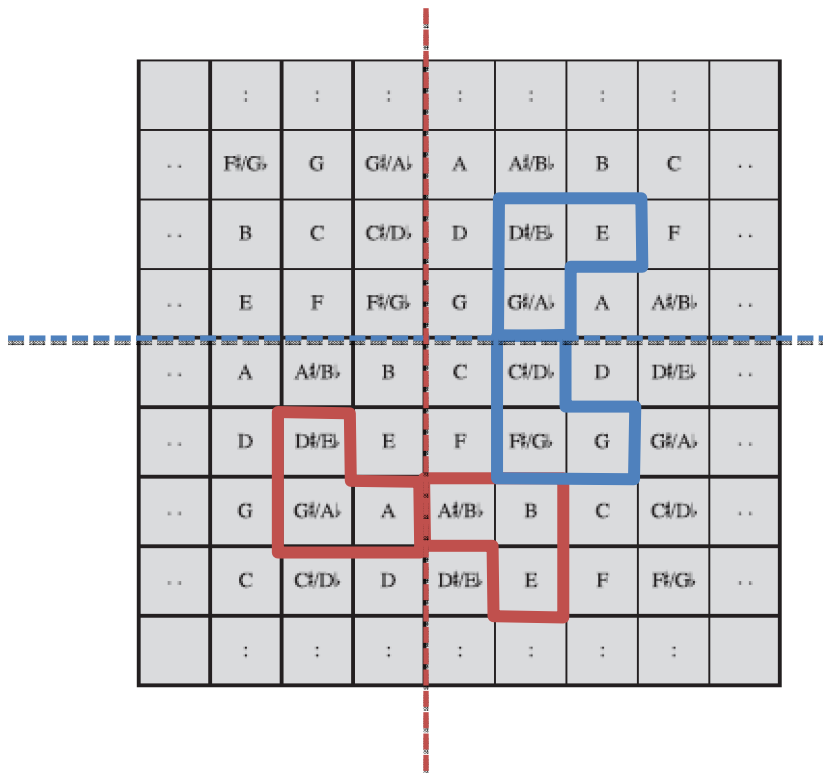
The sequential usage of interval classes 1 and 5 and symmetry within the DIS are observed in mm 31-36. Here, in three part texture, while the right hand prolongs E major sonority (with the suspended note A), left hand states (016) trichords in the bass and treble. The first shows the transposition of the (015) trichord in the bass, C G Ab, by ascending half steps. The middle layer also states (015) on the downbeat of mm. 31-32. The two trichords are then followed by a melodic statement of (0126). Shostakovich again adds additional notes underneath the melodic line, major third and augmented sixth below. However, these attached notes are merely for color and are less important structurally. When mapped on to the DIS, the middle layer of these two measures point to a conceptual center of F. The pitch class also becomes prominent aurally due to the longer durational value of the note, accent, and metric placement.

The fourth beat of m. 32 begins a string of verticalized (016) trichords that become transposed by ascending thirds. These statements are illustrated on the DIS as an L-shape and move laterally along the x-axis. The top note of these trichords, in the meanwhile, presents a modified statement of motive *a* from the P theme; rather than a major third, a minor third is employed between the first two notes, outlining an A minor triad.

While pc set analysis regards (016) and (015) as two separate entities, despite their similarity of intervallic construction, the Dual Interval Space (DIS) can map the two pc sets, as well as others, onto a more definable relationship. In Example 12, three statements of (016) appear in the bass followed by one of (015). The first two instances of (016) appear on the DIS as a chromatic line G#-B with an interval class 5 extending on opposite direction at each end. The last two sets present an even more interesting

relationship. Although the two trichords form different set classes, their symmetry around a horizontal axis is made visible when mapped on to the DIS.

The musical score shows four trichords in the left hand, each highlighted with a blue box. Below the boxes are the labels (015), (015), (015), and (016). The score includes a 'poco legato' marking.



Example 12. Shostakovich, Piano Sonata No. 1, Op. 12: 99-103. Statements of (015) and (016).

Salience

(0126)

(016)

(016)

(015)

Example 13.1. Shostakovich, Piano Sonata No. 1, Op. 12: 83-88. Pc sets consisting of interval classes 1 and 5.

T₁ T₁ T₃ T₅ T₁ T₇ T₁₁

Example 13.2. Brown's reduction of mm. 83-88.

F	F#/Gb	G	G#/Ab	A	A#/Bb	B
A#/Bb	B	C	C#/Db	D	D#/Eb	E
D#/Eb	E	F	F#/Gb	G	G#/Ab	A
G#/Ab	A	A#/Bb	B	C	C#/Db	D
C#/Db	D	D#/Eb	E	F	F#/Gb	G
F#/Gb	G	G#/Ab	A	A#/Bb	B	C
B	C	C#/Db	D	D#/Eb	E	F
E	F	F#/Gb	G	G#/Ab	A	A#/Bb
A	A#/Bb	B	C	C#/Db	D	D#/Eb
D	D#/Eb	E	F	F#/Gb	G	G#/Ab
G	G#/Ab	A	A#/Bb	B	C	C#/Db
C	C#/Db	D	D#/Eb	E	F	F#/Gb

Example 13.3. Symmetry around the F# and the C diatonic scale at mm. 87-89

The two trichords, (015) and (016), that result from the combination of interval classes 1 and 5 play a structural role in several moments of the piece. In Example 13, the second episode opens with a statement of (016) in the LH, and (0126), a subset of (01237), in the RH. Although Shostakovich inserts an extra semitone, D5 in the RH tetrachord, the prominence of interval classes 1 and 5 and the trichord (016) is evident.

As Stephen Brown noticed, this passage also exhibits the juxtaposition of the two governing systems in the sonata, interval classes 1 and 5 and C diatonic scale, and their interaction to create a pitch center¹⁸. In mm. 88-89, the last two statements of the motive are answered by accented G1 and C2, then Bb1 and F1. The two trichords, (F# G C) and

¹⁸ Brown, Stephen. "ic1/ic5 Interaction in the Music of Shostakovich." in *Music Analysis*. 28/2-3 (July 2009): 185

(F# Bb F) form pc set (016) and (015) respectively, and are inversionally symmetrical in the DIS. Here, the salience at a local level points to F#. Despite the C diatonic scale, F# serves as the goal of the descending motion, and is repeated in the low register several times. F# also serves as the axis of symmetry for the trichords (015) and (016) that follow. This symmetry is easily observed when mapped on to the DIS (Example 13.3). Here, the motion to F# by C diatonic scale is represented as a vertical in the y axis that contains the interval class 5. The trichords (015) and (016), on the other hand, exhibit a partial inversion around the Y axis of the F#. The symmetry of the two trichords is easily observed in the DIS, whereas traditional pitch class set analysis cannot put them in a definable relationship.

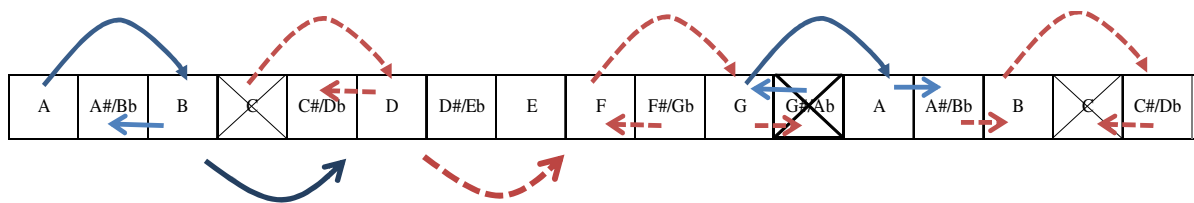
Shostakovich's intentional use of interval classes 1 and 5 as well as the centrality around C at structural points is exemplified at the climax of the entire piece, the end of the first section of the development. After several statements of ascending chromatic scale figures, each one with an added beat in the time signature, the piece comes to a dramatic resolution on repeated C#3, followed by a descending C major scale heard from Exposition 2. Once the C# is repeated 5 times, it resolves to D, then G, forming the familiar (015) trichord over A and D tremolo in the LH. Shostakovich immediately repeats the C# again, this time six times, followed by C and F. This second statement creates the pc set (016), another ic1/ic5 trichord. The symmetry here is around the C#, as illustrated in the DIS.

fff tremolo

Adagio (♩ = 176)

ppp zenebrosso

Example 14.1. Shostakovich, Piano Sonata No. 1, Op. 12: 198-209. Patterns of interval classes 1 and 5.



Example 14.2. M. 209. Symmetric pattern covering the chromatic scale.

A	A#/Bb	B	C	C#/Db	D	D#/Eb	E	F
D	D#/Eb	E	F	F#/Gb	G	G#/Ab	A	A#/Bb
G	G#/Ab	A	A#/Bb	B	C	C#/Db	D	D#/Eb
C	C#/Db	D	D#/Eb	E	F	F#/Gb	G	G#/Ab
F	F#/Gb	G	G#/Ab	A	A#/Bb	B	C	C#/Db
A#/Bb	B	C	C#/Db	D	D#/Eb	E	F	F#/Gb
D#/Eb	E	F	F#/Gb	G	G#/Ab	A	A#/Bb	B

Example 14.3. RH (015) and (016) symmetry on C# over interval class 5 at mm. 199 and 201.

The prominence of the interval classes 1 and 5 in this climatic passage is again demonstrated in the following interval class 1 clusters of Bb, B, C, and C# over the persisting A and D tremolo at mm. 205-208. The tremolo in the lower extremity of the piano signals the winding down of the tumultuous first section of the development and comes to a complete silence.

However, Shostakovich reaches the ultimate centric goal C2 in the following measure before the next development section begins. In pianississimo dynamics, in contrast to the robust repeated clusters that came before, a slow disjunct stepwise passage makes its way to the final interval class 1 statement of C#-C. Besides the fact that C is the last note of the first section of the development, symmetry within the passage also suggests the prominence of C. Despite the ambiguity due to permutation and neighbor-note figures, the pitch material of m. 209 outlines a pattern of ascending semitones. The following horizontal strip of IDS elucidates the sequential pattern employed to displace

the chromatic scale. The first 10 pitches, from A1 to E3, are divided into two statements of a sequence that are symmetrical around the pitch class C. Although the following sequence centers on Ab as the axis, the last three, B, C#, and C create a double neighbor motion which is symmetrical around C again. This passage also illustrates interval class 1 motion from C# to C at two different levels. While the resolution of C#2 to C2 at m. 209 accentuates the interval class 1 at the surface, the C2 also serves as the larger scale goal of the C# that was prolonged from mm. 198-204 through brute repetition.

The aforementioned examples presented in this chapter demonstrate the different applications of the interval classes 1 and 5 on the foreground of the sonata. As the foremost structural element in the foreground, the two interval classes interact with each other to create sequential voice-leading, relate different pc sets of varying cardinality, and establish salience. The relevance of the two interval classes, however, extends beyond the surface, contributing to the overall structure of the sonata.

CHAPTER IV

ANALYSIS OF PIANO SONATA OP. 12

The discussion of centricity in post-tonal music has instigated much debate among scholars. The thorniest argument concerns the problem of prolongation. Early analysts, such as Roy Travis and Felix Salzer created modified versions of Schenkerian graphs to show prolongation of centric pitches, without consideration of post-tonal features on the surface. Such attempts were criticized by Joseph Straus who deemed prolongation an attractive but ultimately useless tool for larger musical spans of atonal music, and formulated four stability conditions (consonance-dissonance, scale-degree, embellishment, and harmony/voice-leading) that must be satisfied in order for a pitch class to be considered “prolonged.”¹⁹ He instead offered an associative model for analyzing the large-scale organization in post-tonal music that is not part of a tonal-style prolongation. This association model uses salience conditions, sometimes referred to as secondary conditions, such as register, metrical placement, duration, frequency of reiteration, and position within the passage to relate prominent pitches that are displaced by time. Straus argues that this relationship becomes more valid especially when the pitch classes in question comprise a prominent pc set used elsewhere in the piece.

In the case of the *Piano Sonata*, rather than a prolongational model, which attempts to fit atonal music in the framework of tonality, an associational model provides more coherence while commenting on the allusions to the traditions of tonal harmony. The saturation of the two interval classes in both the vertical and the horizontal spaces obscures the sense of tonality for the vast majority of the piece. Due to this absence of

¹⁹ Straus, Joseph. "The Problem of Prolongation in Post-Tonal Music." in *Journal of Music Theory* 31/1 (Spring 1987): 1-21.

strong stability conditions, secondary parameters, also known as salience conditions, become more important.²⁰

Several moments of centrality through secondary parameters (henceforth referred to as salience) occur through various means in the sonata. The methods of achieving salience has received much scholarly attention and several authors, including Rudolf Reti, Joseph Straus, Milton Babbitt, and Fred Lerdahl have contributed to defining some of its criteria.²¹ Recently, a dissertation by Denise Elshoff compiled and listed the different types of procedure and techniques for achieving context-assertive pitch hierarchy.²²

Such techniques include:

- Surface emphasis of various kinds
- Placement
- Non-functional harmonic support
- Invariance
- Composing out
- Melodic anchoring
- Disjunct motion (More complete list is shown in the Appendix)

Moreover, Stephen Brown gives a few examples of methods for pitch salience specific to works of Shostakovich.²³ They are:

- Triadic support
- Supporting linear motion (salient pitches serve as starting and/or ending points of linear motion.
- Featuring salient pitches at formal junctures (in particular, the beginnings and endings of phrases, sections, and movements)

²⁰ Buehrer, Ted. "Prolongational Structure in Bartók's Pitch-Centric Music: A Preliminary Study." in *Indiana Theory Review* 18/2 (1996): 1-14.

²¹ Elshoff, Denise. "Melody, Counterpoint, and Tonality in Shostakovich's String Quartets nos. 1-8." Ph.D. diss., Yale University, 2008.

²² Ibid: 115

²³ Brown, Stephen. "ic1/ic5 Interaction in the Music of Shostakovich." in *Music Analysis*. 28/2-3 (July 2009): 185-220.

- Emphasizing salient pitches through various ‘brute force’ methods, such as repetition and octave doubling.
- Composing out of interval classes 1 and 5 as pitch center

Defining salient pitches in the sonata, however, presents several problems. First, the moments of local salience are often fleeting and immediately transition to non-centric passages. Secondly, due to the wide variety of methods Shostakovich chooses to highlight a single pitch, the reading of a passage may suggest more than one salient pitch.

Fleeting Salience

Example 15. Shostakovich, Piano Sonata No. 1, Op. 12: 99-107. Fleeting salience.

The above passage, excerpted from the second thematic area, shows an example of fleeting pitch centers followed by a non-centric passage. In mm. 99-100, the main melodic material shows serialistic quality, stating eight notes of the chromatic scale before repeating one. Although neighbor-note figures are used to briefly return to the previous notes such as the D-C#-D of m. 99 and F#-G-F# of m. 100, the chromaticism of

the line undermines the hearing of a single pitch center. In mm. 101-103 however, the pitch material moves toward the C diatonic space, and the melodic motion rests on A3 twice with relatively longer duration of half notes emphasizing its aural prominence. The left hand, in the meanwhile, prolongs E in octaves before leaping down to B and A, imitating cadential bass motion in A minor. Clearly, A is the temporary salience in these three measures. However, its effect is only fleeting, as the passages that follow no longer support its prominence. At m. 103, although the descending C diatonic scale contains the same pitch material as A minor, its melodic goal is the F# which is emphasized with strong metrical placement and duration. The gesture is then repeated and F# then becomes the next temporary center, although the effect here is created with salient conditions without harmonic or scalar support. In the following measure, the salience of F# is compromised as well, as the piece transitions to more chromatic and non-centric passages. Most centric passages in this sonata exhibit similar fleeting characteristics, often lasting no more than a few measures at a time. Determining the pitch salience, therefore, is a careful process that involves analysis of surface emphasis and structural significance as well as musical intuition.

Multiple Salient Pitches

The image displays a musical score for Shostakovich's Piano Sonata No. 1, Op. 12, measures 130-136. The score is in G major and 4/4 time, marked 'Adagio' with a tempo of quarter note = 72. It features a complex texture with multiple melodic lines. The upper system shows a right-hand melody with a 'rit.' marking, followed by 'Adagio (♩=72)', 'morendo', 'ppp legato', and 'tenebroso'. A blue box highlights a specific passage in the right hand. The lower system shows a left-hand accompaniment with 'ppp' dynamics and a circled note. Pedal markings include '8 con Ped.', '8 senza Ped.', and '8 con Ped.'

Example 16.: Shostakovich, Piano Sonata No. 1, Op. 12: 130-136. Multiple salient pitches.

Due to the highly chromatic nature of the sonata, certain passages may suggest more than one salient pitch as well. In the above example, excerpted from the beginning of the first development section, the materials from both P and S theme are presented over the ostinato of oscillating F# and E#. The ostinato, which persists throughout the section, places strong aural prominence on F# due to its metric placement and the interval of minor second. At m.133, however, another prominent pitch center is juxtaposed over the ostinato – C. The pitch that begins the motivic material from the P theme is doubled in octaves and is immediately followed by E, a major third above. This melodic interval of a major third, along with the other methods of surface emphasis, creates an aural effect similar to that of a root and a third of a triad. Although the melodic material that unfolds immediately afterwards employs a highly chromatic language and avoids a sense of

centricity, the momentary salience of C is revisited at m. 136 in the tenor voice. This passage therefore, contains two dueling salient pitches, F# and C.

Although determining salience in *Piano Sonata Op. 12* presents a number of challenges due to the ambiguity of the musical language employed, recognizing its significance can provide insights into the compositional structure in the absence of harmonic function that traditionally defines the form. Due to the juxtaposition of both tonal and atonal musical structures in a neo-tonal fashion, reading of tonal prolongation is ineffective. Since the musical surface of the piece features highly chromatic language derived from the use of interval classes 1 and 5, the four stability conditions that Straus suggests cannot often be satisfied. However, despite the absence of prolongation, the piece contains many locally salient pitches that temporarily orient the listener's ears. These pitch centers are established through two different types of parameters: primary (tonal harmonic implication) and secondary (context-assertive pitch hierarchy). Although determining pitch salience presents a number of problems due to their fleeting nature and tendency to display multiple salient pitches, some passages suggest relatively strong aural prominence on a single pitch. The significance of these temporary aural centers is that Shostakovich uses them as aural guide, similar to the function of a tonic but without actually prolonging them.

A Structural Background of Salient Pitches

The pitch centers in the sonata not only become prominent in the foreground, but also carry structural weight. These salient pitches do not hold any prolongational value in the middleground, but simply serve as departure and arrival points through the associative model, outlining sections and the overall form. Therefore, rather than a

traditional tonal scheme of a sonata form, the structural coherence is defined by these saliences that provide an associative path that outlines the structural background for the entire composition. The materials that intervene between these boundary pitches, however, are much less stable and do not necessarily prolong the associated pitches.

The four most prominently salient pitches in the sonata are F, F#, C# and C and relations between them are emphasized in P and S themes. These four pitch classes are also a member of the pc set (0156), a sonority that often defines the vertical, and one of the three tetrachords that can be created by chromatically embellishing an interval class 5. Therefore, these saliences exemplify Shostakovich's use of interval classes 1 and 5 in the middleground to make larger scale motivic connection. Unlike the use of the two interval classes in the foreground as linear or vertical sonority, the middleground connection between the members of the tetrachord is not immediately perceived. However, they can be related through the associative model since they occur at several structurally important moments and form a pc set that is prominently featured throughout the piece.²⁴

Not only do these pitches serve as the aural anchors that provide relief amid the sea of dissonance, they also help define the form through rotation. The ordered rotation of these four salient pitch classes has special significance to the sonata form design of the piece. The following figure demonstrates the rotation of salient pitch classes F, F#, C#, and C.

²⁴ Straus, Joseph. "The Problem of Prolongation in Post-Tonal Music." in *Journal of Music Theory* 31/1 (Spring 1987): 15

Given the musical events X, Y and Z, the associative model relates X and Z without making any claims regarding Y. Straus states that these types of associations are frequently used in early twentieth-century music to compose out motivic units over large musical spans. Such long-range associations ensure that the music is motivically integrated at all structural levels.

The image displays three musical staves, each representing a different section of a piece, with annotations for pitch rotation. The top staff, labeled 'Exp', shows a 'P' (Partial rotation) section followed by an 'S' (Ordered Rotation) section. A dashed line connects the end of the P section to the beginning of the S section. The middle staff, labeled 'Dev', shows an 'Unordered Rotation' section followed by a 'Partial rotation' section. The bottom staff, labeled 'Rec', shows a 'P and S combined' section followed by an 'Ordered Rotation' section. The label 'motive aa' appears in the Exp and Rec staves. The label 'v in C:' is located at the end of the Exp staff, and 'HC in eb:' is located at the end of the Dev staff.

Example 17. Rotation of pitch classes F, F#, C# and C.

Exposition

The P thematic area of the exposition begins a partial rotation of F, F#, C#, C succession with only two of the four pitches establishing salience: F and C. The two pitch classes form an interval class 5, a structural interval in the sonata, and serve as the departure and arrival points of several sections; F is prominent in the first measure of all sections except the second section of the development, and C ends the first section of the development and the recapitulation.

Motive a

Φ-Π.
Piano

Motive b

Motive c

Altered V of C?

ff legato
con Ped.

dim. *p* *cresc.* *f*

Example 18. Shostakovich, Piano Sonata No. 1, Op. 12: 1-8. Motives of P theme group.

The above passage introduces the three motives of the P theme, a, b, and c. While motive *c* is constructed almost entirely of interval classes 1 and 5 and suggests no pitch center, motive *a* contains a rare interval of a major third, and highlights the opening pitch F. The half notes assigned to the first two notes, F and A, are also much longer in duration compared to the eighth-note triplet that defines the local rhythmic motive, and are further emphasized with accents. The surface emphasis and the use of a melodic major third in this passage indicate the local centrality of F. The opening statement of the thematic area comes to a close at m. 8 with the repetition of the altered G major chord, a possible suggestion of the dominant sonority in C major, but the resolution never occurs.

Instead, the motives *a* and *c* are repeated again, further extending the gravitational pull of F.

The prominence of F in the opening measures, however, is somewhat ironic in hindsight, as one of the fundamental referential collections besides interval classes 1 and 5 that is prominently featured in the sonata is C diatonic. The arrival of the C major triad at m. 21 is the first suggestion of the collection and is perhaps the most prominent example of centrality on C. In contrast to the previous material, which heavily relies on interval classes 1 and 5 with no strong sense of tonality, the C diatonic scale and triad suddenly dominate the foreground as the arrival at the C major triad gets repeated 5 times. At m. 27, the same C major triad in the right hand reassures the C diatonicism while the left hand states chromatically rising major triads. However, the interval classes 1 and 5 still retain their linear function, moving chromatically in contrary motion to outline a perfect fifth between C2 and G2. This passage serves as the first example of the synthesis between the two systems at work, interval classes 1 and 5 and C diatonic.

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

cresc.

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

f

senza Ped. con Ped.

Example 19. Shostakovich, Piano Sonata No. 1, Op. 12: 18-27. The prominence of C diatonicism.

F#/Gb	G	G#/Ab	A	A#/Bb	B	C	C#/Db	D	D#/Eb
B	C	C#/Db	D	D#/Eb	E	F	F#/Gb	G	G#/Ab
E	F	F#/Gb	G	G#/Ab	A	A#/Bb	B	C	C#/Db
A	A#/Bb	B	C	C#/Db	D	D#/Eb	E	F	F#/Gb
D	D#/Eb	E	F	F#/Gb	G	G#/Ab	A	A#/Bb	B

Example 20. Shostakovich, Piano Sonata No. 1, Op. 12: 21-22. Symmetry of interval classes 1 outlining C major.

After sequential passages utilizing interval classes 1 and 5 develop motive *b*, a restatement of the theme occurs in a canon a major ninth apart at m. 38. Here, the salience of F is established again but is much weaker than the opening statement due to the thicker texture and dissonance resulting from the second entry; the texture doubles as each hand plays both motives *a* and *c* at the same time. The statement is followed by more sequences involving both C diatonic and interval classes 1 and 5, and eventually suggests C centrality again as a complete statement of motive *a* occurs beginning on C for the first time.

The first complete ordered rotation occurs in the second thematic area. Here, the rotation, F, F#, C#, and C, is stated in full and is contained within the first statement of the S1 theme group. This is the rotation in its most stable form. F and C assume their role as the departing gesture and the ultimate goal, and F# and C#, the chromatic alteration of the respective pitch classes, become the temporary centers in between. When mapped on to the DIS, the relation among these pitch centers becomes clear: F moves by semitone to F#, F# by perfect fifth to C#, and C# by semitone to C. The pitches, therefore, move

either horizontally or vertically through the DIS, occupying a square region and forming pc set (0156).

Meno mosso (♩ = 126)

Motive aa

Motive bb

Motive cc

C	C#/Db
F	F#/Gb

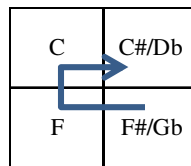
Example 21. Shostakovich, Piano Sonata No. 1, Op. 12: 83-98. Motives of S group and the first rotation of F, F#, C# and C.

The second thematic area begins with repeated statements of motive *aa*, which consists of a descending C diatonic scale settling on F#, another example of the synthesis of C diatonicism and interval classes 1 and 5. Each statement of the motive begins on accented F which quickly descends to F#, highlighting the interval class 1 relationship between the two pitch classes. The *bb* motive that follows is lyrical and humorous in nature. This motive primarily consists of the two interval classes as well, the few exceptions being the major sixth leap from D3 to B3 between mm.90- 91 and a statement of the transposed *aa* motive which includes major seconds. This motive also briefly emphasizes F# at the beginning through metric emphasis and a leap of a major seventh from the pick-up note, G, continuing its salience from the previous motive. The S1 theme rounds out with motive *cc* which highlights two pitches on the surface, C#3 and C2. Whereas C#3 becomes salient using the “brute repetition” method, C2 is emphasized with cadential bass movement of F, G, and C, as well as dynamic accents and low register. These two motions that outline an interval class 1, F to F# and C# to C, define the opening and closing gestures of the thematic material, establishing strong aural salience. The material between these two pairs of salient pitches, however, contains more chromatic motion that obscures the sense of centricity. This method of establishing stronger salience at the beginning and end while placing less stable passages in between becomes composed out to encompass bigger sections in the development and recapitulation.

Development

The development consists of two discrete sections, each divided into slow and fast parts. The first part of the development section continues the use of the four salient pitch

classes at structural points in each section, containing two rotations. The adagio, as discussed earlier in the chapter, displays conflicting pitch centers due to the persistent F# E# ostinato in the bass and statements of motive *a* in several transpositions and transformations. The rotation here is unordered. While F# and E#, enharmonic of F, provide the ostinato bass, C and Db, enharmonic of C#, present the motive *a* in respective order. This rotation, F#, E#, C, and Db, inverts the motion of salient pitches in the DIS for the S theme in which F moved to F# and C# resolved to C.



Example 22. The first unordered rotation in the development mapped on to the DIS.

The second rotation in the allegro that follows is even less stable, but similar to the organization of S theme, the centricity becomes pronounced at the beginning and end of the section. Here, not all pitches become salient on the surface, displaying a partial rotation; while F# dominates the opening measure, F never becomes prominent on the surface. The repeated F# in octaves in the low register quickly develops into freely running eighth-note countermelody that exhibits characteristics of motives from the P and S themes. The material that follows, however, displays no strong salience. As typical of a development section, the texture becomes more complicated as Shostakovich develops various motives, sometimes stating several of them in juxtaposition. The added layers and amplified chromaticism blur the sense of salience for the majority of this section.

The image displays a musical score for Shostakovich's Piano Sonata No. 1, Op. 12, measures 145-152. The score is presented in two systems. The first system begins with a piano introduction marked *ppp cresc.* and *ffpp staccato*. The tempo is indicated as *Allegro (♩ = 100)*. The second system continues the piece, featuring a prominent F# note in the right hand. The score is written in a key signature of one flat (B-flat) and a 2/4 time signature.

Example 23. Shostakovich, Piano Sonata No. 1, Op. 12: 145-152. The prominence of F# at the opening of the Allegro in the first section of the development.

However, following two statements of the P theme and sequences of ascending chromatic scale, an unmistakably salient pitch occurs at m. 198. Shostakovich expands motive *cc* and prolongs C#3 for several measures. Over the tremolo of A1 and D2, which forms the (015) trichord with the C#, the pitch at fortississimo dynamics brings about the most climactic passage in the entire piece. Shostakovich also alternates cluster chords for added aggressiveness, and uses expanding meter that adds an extra beat at each repetition of the C#. This explosive prominence of C# is an epitome of aural emphasis through a secondary parameter: brute repetition with extreme dynamics. At m. 209, the turbulence finally gives away to calm ascending scalar figures that eventually resolve with interval class 1 motion from C#2 to C1, the lowest on the piano, completing the partial rotation, F#, C#, and C.

Example 24. Shostakovich, Piano Sonata No. 1, Op. 12: 198-209. Saliency of C# and its resolution to C at the end of Development 1.

The second section of the development is perhaps the most perplexing of the whole sonata and does not contain a full rotation. Like the first, this section begins slowly, followed by a frantic virtuosic passage. The slow half is characterized by a polyphony of several layers written in three staves. The lower voice utilizes an ascending arpeggiation figure with alternating starting notes of D and Eb, whereas the top voice provides harp-like chordal figures in the high register. In the middle voice where the melodic interest lies, interval classes 1 and 5 again dominate the linear material. The first ascent from G4 to F#4 and its reiteration briefly focus aural interest on F#, but soon the chromaticism blurs the colors. At m. 238, salient F# occurs again as a trill in the bass register as the left

hand repeats a descending major seventh of B1 and C, forming pc set (016). The section comes to an abrupt end without prominently stating F or C#. The following allegro section, which utilizes heavily chromatic sequential passages mostly developing motive *b*, does not prominently emphasize any of the structural pitches suggested in the exposition. In fact, after the complete, ordered rotation in the second thematic area, the pattern of pitches becomes increasingly distorted until its omission in this section.

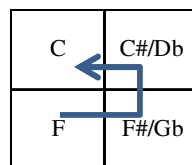
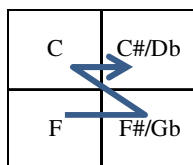
The image shows a musical score for Shostakovich's Piano Sonata No. 1, Op. 12, measures 210-214. The score is in 5/4 time and marked 'Lento' with a tempo of quarter note = 92. It features two systems of piano accompaniment. The first system includes a treble clef staff with 'pp' dynamics and a bass clef staff with 'pp' dynamics and the instruction 'dolce ma marcato'. Blue arrows point to specific notes in the treble clef staff, and asterisks mark certain notes in both staves. The second system continues the musical texture with similar markings.

Example 25. Shostakovich, Piano Sonata No. 1, Op. 12: 210-214. Brief salience of F# at the opening of Lento in the second section of the development.

Example 26. Shostakovich, Piano Sonata No. 1, Op. 12: 235-244. Salient F# and its resolution to C at the end of the Lento in the second section of the development.

Recapitulation

The F, F#, C#, and C rotation, which becomes gradually unstable in the development, is finally normalized in the recapitulation. This section contains two rotations, each containing a statement of P in the upper voice in original transposition. The first states all four pitches but is unordered. The second, however, contains a full, ordered rotation that recreates the pattern in the exposition. This reconciliation of pitch centers to its normal form after their deformation in the development is reminiscent of the principles of the traditional sonata allegro form, in which the recapitulation normalizes the tonic.



Example 27. The two rotations, unordered and ordered, of Recapitulation mapped onto the DIS.

The first statement beginning at m. 274 presents the P theme in the right hand in its original transposition, recreating the salience of F. The motive is doubled in octaves and contains the chromatic *c* motive within the octave as well. Left hand, on the other hand, moves within the *ic1/ic5* space utilizing the melodic material from the second section of the development. This motive, also in octaves, leaps several times to F#, presenting another salience in juxtaposition to the F in the right hand. The prominence of C and C# occurs at m. 278 as the S theme enters. Here, motive *aa* is transposed up a perfect fifth to begin on C, and descend down to C#. The gesture is then repeated for further emphasis on those two pitches. C# becomes accentuated for one last time when transposed motive *bb* occurs at m. 280, opening with a major seventh leap from D3 to C#4.

8

Meno mosso (♩ = 138)

ff

The image shows a page of musical notation for Shostakovich's Piano Sonata No. 1, Op. 12: 273-280. The page is numbered '8' in the top left corner. The tempo is marked 'Meno mosso' with a quarter note equal to 138 beats per minute. The dynamics include 'ff' (fortissimo). The score is written for piano and consists of four systems of two staves each. The notation is complex, featuring many accidentals and a dense harmonic texture. There are several annotations: a blue box around the tempo marking, blue arrows pointing to specific notes in the bass clef of the first system, and blue boxes around melodic lines in the bass clef of the third and fourth systems.

Example 28. Shostakovich, Piano Sonata No. 1, Op. 12: 273-280. The first statement of the rotation in Recapitulation.

Moderato (♩ = 116)

più ff

8- - - - -

8- - - - -

8- - - - -

8- - - - -

(0127) Allegro (♩ = 104)

p *f*

C diatonic

Example 29. Shostakovich, Piano Sonata No. 1, Op. 12: 281-288. The last statement of the rotation in Recapitulation.

The last rotation occurs with the final statement of the P theme. Here, the four pitches become salient in the order presented in the exposition, F, F#, C#, then C. F becomes salient as the last statement of bb from the previous section elides into the last statement of motive *a* and *c* with a change of rhythmic pulse from triple to duple. At m. 285, a climactic gesture involving repeated chords prepares for the final moment of the piece. The two dissonant chords in both hands hammer away at both extremes of the piano in fortissimo dynamics. The right hand chord consists of pc set (0126), a familiar tetrachord in the ic1/ic5 space, whereas the left hand plays G dominant seventh chord over the bass F#. This passage is another example of the contest between the two systems in works, interval classes 1 and 5, and C diatonicism. Shostakovich sums up the sonata with final ascending sequences of (0127) tetrachord and (016) trichord in the right hand over descending thirds in C diatonic scale in the penultimate measure. On the downbeat of the final measure, F# is stated in all four voices in extreme registers before the familiar repeated note motive rests on C# over a C diatonic scalar passage in the left hand. The piece violently ends with a gesture reminiscent of cadential bass motion in the key of C major, stating F and G before resolving to the lowest C on the piano.

CHAPTER V

CONCLUSION

Shostakovich's *Piano Sonata, Op. 12*, holds much significance in studying the change of his musical style in the late 1920's. The sudden shift toward Modernism and the prevalent use of dissonance through interval classes 1 and 5 bring the sonata to the status of one of Shostakovich's most experimental. As Stephen Brown has discussed in his dissertation and article, the prominence of the two interval classes also becomes an important musical factor later in his career. As one of the earliest examples of this technique, *Piano Sonata, Op. 12* deserves a closer look at the interaction between the two intervals and their relation to the structure. The goal of this study was to elucidate the linear unfolding of the two interval classes into pc sets of different cardinalities over a variety of timespans. At the largest perspective—that of the entire piece—interval classes 1 and 5 connect referential pitches that are emphasized at significant moments in the sonata form. Shostakovich utilizes several techniques to establish certain notes as local saliences, such as the use of C diatonicism or the frequent repetition of a note to encourage the perception of aural prominence around a specific pitch (if only for a moment). These referential pitches succeed one another by interval classes 1 or 5, as demonstrated by the rotation of pitch classes F, F#, C#, and C, pc set (0156), at important structural junctures. Exploring the extent of this motivic parallelism provides a more complete analysis of the piece and a better understanding of how Shostakovich was able to reconcile tonal (or at least pitch-centric) techniques with the more chromatic language of pitch-class motives in a truly neo-tonal context.

APPENDIX A

THE FORM OF THE *PIANO SONATA OP. 12*

Section	Exp 1				Exp 2		Dev				Rec
Theme groups	P	P'	P''	P'''	S1	S2	P/S 1	P/S1	S1/P/S 2	P S2	P S1
Measure numbers	38	52	63	83	112	132	148	210	246	274	

APPENDIX B

ELSHOFF'S PROCEDURES FOR ESTABLISHING CONTEXT-ASSERTIVE PITCH

HIERARCHY.²⁵

Types of Procedures	Techniques	Sources
I. Surface emphasis: most emphasized	reiteration; duration; doubling; dynamic accent; metric accent; timbral accent; relatively dense (simultaneous attacks); registral accent	Reti 1958; Travis 1959; Berger 1963; Harder 1973; Whittall 1975; Morgan 1976; Straus 1982a, 1982b, 1990; Reise 1983; van den Toorn 1983; Antokoletz 1984; Perle 1984; Taruskin 1987; Lerdahl 1989; Parks 1989; Pople 1989; Wilson 1992; Lerdahl 2001
II. Placement: first and last, highest and lowest, midpoint (more generally, at "key structural points")	metric accent; pitch disposition; harmonic disposition; collection disposition; structural disposition; thematic exposition	Babbitt 1949; Salzer 1952; Forte 1955; Reti 1958; Travis 1959, 1966, 1970; Berger 1963; Harder 1973; Whittall 1975; Morgan 1976; Straus 1982a, 1982b, 1990; van den Toorn 1983; Antokoletz 1984; Perle 1984; Cinnamon 1986; Taruskin 1987, 1988; Lerdahl 1989; Parks 1989; Pople 1989; Wilson 1992; Harrison 1994; Silberman 2006
III. Non-functional harmonic support	support from perfect fifth or perfect-fifth harmony; harmonic invariance (referential harmony); collection invariance (referential collection); harmonic stasis	Reti 1958; Travis 1959; Berger 1963; Whittall 1975; van den Toorn 1983; Antokoletz 1984; Taruskin 1987; Wilson 1992; Harrison 1994
IV. Invariance	pitch (registral) invariance; pitch-class invariance; harmonic invariance (referential harmony); collection invariance (referential collection); rhythmic invariance; dynamic invariance; timbral invariance; structural invariance; parallelism	Babbitt 1949; Reti 1958; Travis 1959, 1966, 1970; Morgan 1976; Straus 1982b, 1990; Perle 1984; Cinnamon 1986; Taruskin 1987, 1988; Lerdahl 1989; Parks 1989; Pople 1989; Wilson 1992; Lerdahl 2001

²⁵ Elshoff, Denise. "Melody, Counterpoint, and Tonality in Shostakovich's String Quartets nos. 1-8." Ph.D. diss., Yale University, 2008: 115.

v. Composing out	Tone centers unfold referential harmony or collection	Salzer 1952; Travis 1959, 1966, 1970; Whittall 1975; Morgan 1976; Straus 1982a, 1982b, 1990; Reise 1983; Cinnamon 1986; Forte 1987, 1988; Taruskin 1987, 1988; Wison 1992
VI. Melodic anchoring I temporal order	In a melodic line, two consecutive pitches a step apart tend to sound like an unstable pitch resolving to a stable pitch, especially when motion is by ascending m2.	Bharucha 1984, 1996; Brown, Butler, and Jones 1994; Brown and Butler 1981; Butler 1989; Laden 1994; Lerdahl 2001
VII. Disjunct motion	In a melodic line, a pitch that is followed by a skip or leap tends to sound relatively stable.	Bharucha 1984, 1996

APPENDIX C

THE LOCATION OF SALIENT PITCHES IN PIANO SONATA OP. 12

	#	Location	Salienc e	Salienc Conditions	Stability Conditions
EXP1	1	m. 1	F	<ul style="list-style-type: none"> - Surface emphasis; accent markings, downbeat - Formal juncture; the beginning of the P theme - Relative duration; half note against triplet eighth 	<ul style="list-style-type: none"> - Harmonic support; a melodic major third (Fleeting implication of F triad)
	2	m. 21	C	<ul style="list-style-type: none"> - Surface emphasis; doubling, placement on downbeat followed by a crescendo - Registral extremes; tonic placed in the lowest register - First instance of C diatonicism. - Repetition; C major triad repeated 5 times 	<ul style="list-style-type: none"> - Harmonic support; root position C major triad
	3	m. 38	F	<ul style="list-style-type: none"> - Surface emphasis; marcato and forte dynamics - Formal juncture; restatement of P theme in original transposition 	
	4	m. 63	C	<ul style="list-style-type: none"> - Surface emphasis; accent markings, downbeat, - Formal juncture: first statement of P theme in C - Relative duration 	<ul style="list-style-type: none"> - Harmonic support; C major triad (with D in the bass) - Repeated use of motive <i>b</i> outlining C and E
EXP2	5	m. 83	F	<ul style="list-style-type: none"> - Surface emphasis; fortissimo dynamics, accent marking - Formal juncture; beginning of S1 theme - Composing out; recurring accent on F at beginning of themes 	
	6	m. 84	F#	<ul style="list-style-type: none"> - Relative duration and placement; end of a descending scalar passage - Repetition; same motive repeated 5 times - Register and doubling - Composing out; icion between F and F# 	
	7	m. 95	C#	<ul style="list-style-type: none"> - Repetition 	

	8	m. 96	C	<ul style="list-style-type: none"> - Low register - Last note of the S1 theme - Surface emphasis; accent marking - Preceded by P4 below 	
	9	m. 129	G?		- Triadic
DEV	10	m. 132	F#/E#	<ul style="list-style-type: none"> - Low register - Repeated F# E# ostinato 	
	12	m. 133	C	<ul style="list-style-type: none"> - Harmonic support; major third - Relative duration - Statement of P theme 	
	13	m. 137	Db (C#)	"	
	14	m. 148	F#	<ul style="list-style-type: none"> - Repetition - Texture; F# repeated in octaves by itself 	
	15	m. 175	C	<ul style="list-style-type: none"> - Harmonic support; major third - Relative duration - Statement of P theme 	- C diatonic scale
	16	m. 183	C	"	"
	17	m. 198	C#	<ul style="list-style-type: none"> - Repetition - Surface emphasis; dynamic accent 	
	19	m. 209	C	<ul style="list-style-type: none"> - Placement; last note of the section - Lowest C on the piano - Surface emphasis; Fermata 	
		m. 211	F#	<ul style="list-style-type: none"> - Disjunct motion; Goal of a major seventh leap - Surface emphasis; Relatively longer duration and metric accent 	
		m. 237	F#	<ul style="list-style-type: none"> - Surface emphasis; metric accent, duration, trill 	- F# major triad in the previous measure
REC	22	m. 246	Eb	<ul style="list-style-type: none"> - Surface emphasis; only voice, low register, relative duration - Placement; beginning of motive <i>aaa</i> 	<ul style="list-style-type: none"> - Descending fifth bassline - extended ii - V
	23	m. 274	F	<ul style="list-style-type: none"> - Surface emphasis; accent markings, downbeat - Harmonic support; major third - Formal juncture; the beginning of the P theme 	
	24	m. 274	F#	<ul style="list-style-type: none"> - Disjunct motion; Goal of a major seventh leap 	
	25	m. 278	C	<ul style="list-style-type: none"> - Surface emphasis; dynamic accent, relative duration - Placement; beginning of motive <i>aa</i> 	

26	m. 278	C#	<ul style="list-style-type: none"> - Placement; last note of the motive <i>aa</i>, goal of the descending motion. - Disjunct motion; the goal of the major seventh leap that opens motive <i>aaa</i> at m. 280. 	
27	m. 282	F	<ul style="list-style-type: none"> - Harmonic support; major third - Repetition - Doubling 	
28	m. 285	F#	<ul style="list-style-type: none"> - Repetition - Register 	
29	m. 288	C#	<ul style="list-style-type: none"> - Repetition - Doubling 	
30	m. 288	C	<ul style="list-style-type: none"> - Registral extreme - Placement; last note of the piece 	

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