

A Mathematical Insight into Balakirev's Orientalism in *Islamey*

Nikita Mamedov✉

North America International School, Shanghai, China

✉ Corresponding author: nmamedovmusic@aol.com

ARTICLE INFO

Received: July 2, 2019

Accepted: August 21, 2019

Published: September 1, 2019

DOI: <https://doi.org/10.48293/IJMSTA-48>

Keywords:

Balakirev

music analysis

music and mathematics

music form

ABSTRACT

Balakirev's piano work *Islamey*, composed in 1869 and revised in 1902, consists of three sections. This research will look at the A-section from perspective of form and structure by focusing on motivic segmentation. In the A-section of this composition, each phrase is a combination of variations and fragmentations of the three motives (labelled *a*, *b*, and *c*). A set of four or five motives produces a sole group. The opening section of *Islamey* contains ten separate groups, all unique in their musical construction. By integrating mathematics and music theory, it is evident that Balakirev produces three types of group structures in this work. These include: (1) groups that contain *mot. a* and *mot. b*, which utilize prime, variation, and fragmentation forms; (2) groups that only contain *mot. c*, which use the variation form; (3) groups that only contain *mot. b*, which use the fragmentation form.

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1 Introduction

The tradition of Russian classical music commenced at the onset of 19th century with Mikhail Glinka, acclaimed as "the father of Russian music", becoming the first Russian national composer to carve out a unique compositional style, albeit with Italian features [1]. Along with historically-prominent operas *A Life for the Tsar* (1836) and *Ruslan and Lyudmila* (1842), Glinka's works serve as a source of inspiration for proceeding composers, such as the representatives of the Mighty Handful. The five composers include Mily Balakirev (1837-1910), Alexander Borodin (1833-1887), César Cui (1835-1918), Modest Mussorgsky (1839-1881), and Nikolai Rimsky-Korsakov (1844-1908), who expand and develop the 'Russianness' in music [2]. They began collaborating in St. Petersburg in the mid-1850s by taking on a rigorous attempt to produce strictly Russian compositions [3]. From the Russian submediant to the notion of tonal mutability, there are multiple traits that separate the Mighty Five members from other Russian and non-Russian composers [4], [5]. One of such prominent traits is musical orientalism that can be traced in Balakirev's piano work *Islamey*, likewise known as *Oriental Fantasy* [6].

2 The Mathematical Approach to Study Form

Balakirev completed *Islamey* in 1869 and later revised the work in 1902. *Islamey* is divided into three unique sections, each characterized by a particular tempo, level of lyricism, and pianistically-technical requirements. Balakirev's musical language is at the apex of its development throughout the work, emphasized by the composer's approach to employ various scales and modes, as well as to suggest a wide range of tonal instabilities, and while such analytical components are prominent from theoretical perspective when comparing all three sections of the work, it is the notions of orientalism and heterophony in the first section that are of most interest from empirical standpoint, formed as Balakirev carefully maneuvers multiple variations derived from a Caucasian dance tune [7]. Balakirev generates three separate segments that will be referred to as "motives" and defined as *mot. a*, *mot. b*, and *mot. c*. A motive is a short musical idea that undergoes changes in form and structure throughout the piece of music and is typically introduced at the beginning of the composition [8]. The frequent recurrences of motivic structures in a piece create a musical character that can be analysed through theory. The musical permutations that are applied

to motives define a composer's artistic approach and compositional interpretation. In *Islamey*, the three motives are the building blocks of the first section of the work and are found either in prime form, variation form, or fragmentation form.

The motive is considered to be in prime form if it is presented in its original arrangement throughout the music. The motive is said to be in variation form if any musical modifications are generated in relation to the prime form. Slight changes in melody, harmony, voicing, as well as articulation and dynamics produce a variation [9]. The motive undergoes a fragmentation if such motive is utilized by the composer partially. In fragmentation, a musical reduction of a motive occurs, allowing the composer to employ merely a portion of such motive [10]. The three operations will be defined by variable y , as in $mot. x^y$, where $y = 0$ if $mot. x$ is a prime form and $y > 0$ if $mot. x$ is a variation. The variable fr will be assigned to a motive that has been fragmented. Furthermore, T_x will define motives that undergo direct musical transposition. A set of four or five motives will be considered as a sole group. The opening section contains a total of nine musical groups with four motives each and one musical group with five motives. Each group is distinct in its own way and is built on combinations of $mot. a^0$ (as shown in Figure 1), $mot. b^0$ (as shown in Figure 2), and $mot. c^0$ (as shown in Figure 3). The A-section of *Islamey* can be found at the end of the article in Figure 4 [11].



Figure 1. The opening $mot. a^0$ in prime form.



Figure 2. The opening $mot. b^0$ in prime form.



Figure 3. The opening $mot. c^0$ in prime form.

3 Analysis

The opening group presents $mot. a$ and $mot. b$ as prime form monophony and is the only group to do so. There are two important aspects to consider in structure and cohesiveness of both prime forms that are not seen in any other groups in the first section of *Islamey*. First, both motives contain a raised fifth that is lowered in its resolution. The A^{\sharp} in m. 1, m. 3, m. 5, and m. 7 is resolved to A^{\flat} in m. 2, m. 4, m. 6, and m. 8 respectively. Second, both motives represent a G^{\flat} major tonality (IV) resolving to D^{\flat} major (I), generating a hypothetical subdominant-tonic relation. Such a simple approach deceives the listener, as the piece rapidly expands in artistic and technical complexity. It is also important to note that the tradition of pianistically undemanding introduction is not uncommon in Russian music. One of such later examples exists in the opening of the first movement of Rachmaninoff's Piano Concerto No. 3 in D minor [12]. In the first group of *Islamey*, mm.1-2 and mm. 3-4 = $mot. a^0$, while mm.5-6 and mm. 7-8 = $mot. b^0$.

The variations of both motives are introduced in Group II and the main melody of $mot. a^1$ is altered and incomplete, as certain pitches are not consistently used. Instead of the raised fifth as seen in the opening group, Balakirev uses a raised tonic in m. 9, m. 11, m. 13, and m. 15 to convey dissonance. The texture and the melody of $mot. b^1$ likewise differs from its prime form. The accompaniment in $mot. a^1$ is generated through the use of dyads, where Balakirev chooses to employ only perfect harmonic intervals, which include fourths (P4), fifths (P5), and octaves (P8). On the contrary, the accompaniment of $mot. b^1$ consists of octaves and chords, including triads and complete and incomplete seventh chords to provide musical reinforcement for the right hand's melody. Therefore, mm.9-10 and mm. 11-12 = $mot. a^1$, while mm.13-14 and mm. 15-16 = $mot. b^1$.

The third group only utilizes $mot. c$, which is seen throughout *Islamey* solely in variation form. The actual melody in all four segments can be found in the inner voices, as Balakirev applies the hocket technique in order to outline the melodic line. The third and the fourth segments are identical with the exception of a supplementary F-octaves on the third, sixth, ninth, and twelfth beats of the fourth segment, turning the fourth segment into a variation of the third segment. Therefore, mm.17-18 and mm. 19-20 = $mot. c^1$, mm. 21-22 = $mot. c^2$, and mm.23-24 = $(mot. c^2)^1$.

Balakirev returns to the first two motives in the fourth group. This group is similar to the second group, only with a much thicker texture and a larger range of notes. While depicting a similar melody, the second segment is not reinstated. In the third

segment, Balakirev incorporates identical music in the right hand as of *mot. b¹*, while changing the pitches in the left hand. In the fourth segment, Balakirev utilizes only certain identical parts in the right hand, similar to *mot. b¹*. Both of *mot. b* variations are defined in contrary motion and utilize all possible twelve pitch-classes. A significant trait of the fourth group as a whole is the fact that every segment contains an interval of a third. Therefore, mm. 25-26 = *mot. a²*, mm.27-28 = *mot. a³*, mm.29-30 = (*mot. b¹*)¹, and mm.31-32 = (*mot. b¹*)².

Group V (mm. 33-44) continues with similar structure by incessantly utilizing *mot. a* and *mot. b*, only this time incorporating elements of transposition and fragmentation. Transposition is seen in both motives of this group, as the tonality modulates to D major. Additionally, even though the first two segments of the group are identical, mm. 35-36 are composed one octave higher than mm. 33-34. Furthermore, the complete transposition of *mot. a⁴* as in relation to *mot. a⁰* would mean that *mot. a⁴* would start on pitch B rather than on F#. Lastly, while *mot. a⁰* consists of the subdominant resolving into tonic, portraying a modification of a plagal cadence, *mot. a⁴* does the opposite as tonality of D major resolves into tonality of G# major. Both left and right hands take turns playing and generate yet another example of hocket technique, previously seen in the third group. Looking at the second motive, it is evident that there are two repetitions of *mot. b²* (a transposition of *T₁₂*) before Balakirev applies fragmentation. Even though the third variation of *mot. b* begins in the same fashion as the first two, it deviates into sets of thirds, generating diminished seventh chords that ascend in parallel motion. The fifth segment of this group contains a fragmentation of *mot. b¹*. Therefore, m.33-34 and mm. 35-36 = *mot. a⁴*, mm. 37-38 and mm. 39-40 = *mot. b²*, and mm.41-44 = (*mot. b²*)¹.

Abjuring *mot. a* and *mot. b*, Balakirev returns to utilization of merely the *mot. c* in the sixth group, similarly to the third group. In this variation, there is a clear deviance of rhythm in all four segments, as well as a contrasting left-hand melody that generates a sense of counterpoint. Additionally, transposition is evident in the right hand on the third and the fourth repeats. Looking solely at the right hand, it is likewise possible to define *mot. c⁵* as *T₅* (equivalent to *mot. c³*) and *mot. c⁶* as *T₇* (equivalent to *mot. c⁴*) with a raised E. Therefore, mm. 45-46 = *mot. c³*, mm. 47-48 = *mot. c⁴*, mm. 49-50 = *mot. c⁵*, and mm. 51-52 = *mot. c⁶*.

The seventh group is the final one in the first section to use variations of only *mot. c*. The contrasting aspects can be found in the hidden melody, rhythmic deviance, pianistic technique, and partial utilization of a hocket technique. While hinted, no direct transposition exists. Therefore, mm. 53-54 = *mot. c⁷*, mm. 55-56 = *mot. c⁸*, mm. 57-58 = *mot. c⁹*, and mm. 59-60 = *mot. c¹⁰*.

Balakirev returns to the unity of *mot. a* and *mot. b* in the eighth group, found in mm. 61-68. The variation of the first motive in this group is similar to the *mot. a* variation in the fifth group, where the composer alters the tonality and its resolution. In this passage, Balakirev modulates back to the key of D b major, yet this time beginning *mot. a* on G b major to clearly resolve into the home key. Hocket is used once again to emphasize the main melody in addition to *T₁₂* operation between the first and the second segments. The uniqueness of *mot. b⁶* is seen in the textural change in the right hand, as well as in the chordal and triadic accompaniment in the left hand, previously seen in *mot. a* from the second group. Lastly, similarly to the first two segments of the group, the two *mot. b³* are one octave apart. Therefore, mm. 61-62 and mm. 63-64 = *mot. a⁵*, while mm. 65-66 and 67-68 = *mot. b³*.

The ninth group is analysed differently than all previous groups, as it entirely consists of fragmentation of the first part of *mot. b¹*. This group incorporates eight measures, divided into four identical in structure segments and moves in perpetuum mobile. The left hand of the first two motives is centralized on D b arpeggiation, since the lack of F and F b keeps the actual tonality hidden. The left hand of the final two motives contains its own contrapuntal melody. The right hand consists of twelve pitches in each measure, which will be represented as a set of two variables *q* and *r*, where *q* is the fragmentation of set of pitches #1 through #6 from *mot. b¹* and *r* is the fragmentation of set of pitches #7 through #12 in *mot. b¹*. Therefore, mm. 69-71 and mm. 73-75 will be defined as a set of {*q, r*}, while m. 72 and m. 76 will be defined as a set of {*r, r*}. The right hand in mm. 69-72 is identical to mm. 73-76. The simultaneously played pitches, such as any two pitches *m* and *n* will be defined as (*m/n*). The pitch-classes are centred at D b, where D b = 0. Therefore,

m. 69: *q* = {1, 5/2, 4, 9/5, 8, 12/9};

m. 69: *r* = {10, 14/11, 12/9, 11/7, 6, 9/5}.

m. 70: *q* = {3, 7/4, 6, 11/7, 10, 14/11};

m. 70: *r* = {11, 16/12, 14/11, 12/9, 8, 11/7}.

m. 71: *q* = {4, 9/5, 8, 12/9, 11, 16/12};

m. 71: *r* = {13, 17/14, 16/12, 14/11, 10, 12/9}.

m. 72: *r¹* = {15, 19/16, 17/14, 16/12, 10, 14/12}.

m. 72: *r²* = {16, 21/17, 19/16, 17/14, 13, 16/12}.

Based on the data, there is no direct transposition between the fragments of the ninth group, yet certain elements of transposition and translation can be traced. First, the elements in set *q* in m. 70 are two semitones higher than the elements of set *q* in m. 69. Second, the last four elements of *q* at m. 69 are the initial four elements of *q* at m. 71. Third, the opening three elements of *r* in m. 69 are the final three elements of *r* in m. 71, except in different order.

The tenth group is the final one of the first section and consists of *mot. a* and *mot. b*. The *mot. a⁶* and (*mot. a⁶*)¹ can be expressed in a series of first inversion triads and centralized on D major tonality resolving to A major. It is evident that (*mot. a⁶*)¹ is a variation of *mot. a⁶* since only the left hand alters at the time when the right hand remains identical. By looking at (*mot. b¹*)³ and (*mot. b¹*)⁴, it can be concluded that both are variations of *mot. b¹* and only the beginnings of each of those motives differ

from the original form and $(mot. b')^4$ is the extended variation of $(mot. b')^3$. Therefore, mm. 77-78 = $mot. a^6$, mm. 79-80 = $(mot. b')^3$, mm. 81-82 = $(mot. a^6)'$, and mm. 83-84 = $(mot. b')^4$.

Allegro agitato

The musical score is written for piano and consists of ten systems of staves. The first system includes a bass clef and a forte (*f*) dynamic marking. The second system continues with the bass clef and a piano (*p*) dynamic marking. The third system is a grand staff (treble and bass clefs) with a piano (*p*) dynamic marking. The fourth system continues with the grand staff and a piano (*p*) dynamic marking. The fifth system continues with the grand staff and a piano (*p*) dynamic marking. The sixth system continues with the grand staff and a piano (*p*) dynamic marking. The seventh system continues with the grand staff and a piano (*p*) dynamic marking. The eighth system continues with the grand staff and a piano (*p*) dynamic marking. The ninth system continues with the grand staff and a piano (*p*) dynamic marking. The tenth system continues with the grand staff and a piano (*p*) dynamic marking. The score includes various musical notations such as notes, rests, and dynamic markings.

The image displays a page of musical notation for Balakirev's 'Islamey'. The score is written for piano and consists of nine systems of music. Each system includes a treble and bass clef staff. The notation is characterized by complex rhythmic patterns, including sixteenth and thirty-second notes, and frequent use of accidentals. Dynamics are indicated by 'p' (piano) and 'ff' (fortissimo). Performance instructions include 'il ritmo ben marcato' (the rhythm well marked), 'poco a poco' (little by little), 'cresc.' (crescendo), and 'scen.' (scenari). The key signature is three flats (B-flat, E-flat, A-flat), and the time signature is 2/4. The piece concludes with a final chord in the right hand.

The image displays a musical score for the A-section of Balakirev's *Islamey*, measures 1-84. The score is written for piano and includes vocal lines with Russian lyrics. The music is in 2/4 time and features complex rhythmic patterns and dynamic markings such as *fff*, *p*, and *ff*. The lyrics are: "poco a poco cre-scen-do a-gi-ta-to". The score is divided into systems, with some systems containing multiple staves for piano and vocal parts.

Figure 4. The A-section of *Islamey*, mm. 1-84.

4 Conclusions

The particular structure and the formation of musical elements is a significant component to the analysis of Balakirev's works and Russian music in general [13]. The grouping of motivic segments according to prime, variation, and fragmentation forms is a prominent characteristic in Balakirev's other piano works, particularly evident in *Polka in F# minor* and *Scherzo No. 1 in B b minor* [14]. Therefore, such a mathematical approach can likewise be applied to further understand the form of these compositions. Since Balakirev's goal was to emphasize on stylistic musical traits and characteristics of own musical nationalism, it is very unlikely that mathematical approach was more significant than the qualities of style, for which *Mighty Five* are

known, yet it is evident that the piece is structurally organized. The phrases of *Islamey* in the first section are derived from the Caucasian folk tune with the use of compositional methods, such as variation and fragmentation. Based on the structure and the motivic development that is seen through *Islamey*, it is evident that Balakirev assembles the musical groups in three ways: (1) groups that contain *mot. a* and *mot. b* employing prime, variation, and fragmentation forms; (2) groups that contain *mot. c* employing variation form; (3) groups that contain *mot. b* employing the fragmentation form.

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