



Alexander Borodin's Contributions to Arts and Sciences

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Abstract

Alexander Borodin, a member of the Mighty Five composers, is presented. As an artist, due to his main compositions, Borodin got world fame. In contrast, his medical and scientific works and educational innovations are practically forgotten. We consider whether there is an objective way to compare the value of scientific and artistic creativity, including musical composing.

Key words: Alexander Borodin; Composing, Science, Medicine, Chemistry.

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Introduction

The Mighty Five Russian composers were self-trained amateurs from St Petersburg who collaborated from 1856 to 1870. The last one who joined the group in 1862 was Alexander Borodin; that year, he was 28, Cesar Cui 27, Mily Balakirev 25, Modest Mussorgsky 23 and Nikolai Rimsky-Korsakov 18.

In contrast to the elite status composers at the Conservatory during the Romantic period, such as Pyotr Ilych Tchaikovsky (1840-1893), Mikhail Glinka (1804-1857) and Alexander Dragomyzhsky (1813-1869) who produced some typical Russian kind of music in their operas, the Five wanted to explore elements of rural country life, music, poetry, roots of Russian people and show national and Slavic pride. Their goal was to prevent or reduce western ideals entering into Russian culture. Balakirev was the only professional musician of the Five, the others were amateurs with modest musical education. He encouraged their composing efforts and contributed to the reputation of the group. Balakirev also helped Tchaikovsky to create the fantasy-overture *Romeo and Juliet* and the *Manfred Symphony*.

It was the time when the serfdom was finally abolished. This happened in Russia in 1861 and it was a crucial point in the country's history, marking the first stage of democratic transformation. In the Prussian Kingdom and the Austrian Empire, such reforms occurred in 1781 and 1848, respectively.

Alexander Borodin was a medical doctor and a scientist who studied and composed music in his spare time and during sick leave. In this paper, his life and achievements are briefly presented. Borodin shared his permanent interest in both fields and we would like to point out his accomplishments in these two types of creativity.

Life

Borodin was born in November 1833 in St Petersburg and died at the age of 53 in the same city, in February, 1887. His biological father was a 62-year-old Georgian prince Luka Stepanovich Gedeveshvil; his mother was Evdokia Konstan-

tinovna Antonova, a 25-year-old, beautiful and intelligent Russian. The illegitimate son was registered as the son of a prince's serf Porfiry Borodin. At the age of seven, Alexander got emancipation from serfdom by the Prince who arranged a marriage of his mother to a medical doctor and provided them a large house and money for the best education of the child, who could not attend a regular public school; therefore he got the best tutors at home.

The child was talented for languages and music. As a schoolboy, he learned to speak French, German and English and mastered the cello, flute, piano and outlines of composing; later on, he learned himself to play the violin. However, when Borodin was a little older, he became interested in the natural sciences, especially in chemistry. In 1850, the 16-year old Borodin began studies at the Medical-Surgical Academy in St Petersburg.

In parallel, Borodin significantly contributed to scientific research, mainly in chemistry and medicine. With his colleagues he created a medical school for female doctors, the first one in Russia. However, at the same time he continued to progress in composing music. His main job was science and he was a "Sunday Composer", as he used to say. Actually, he devoted very little time to music.

Borodin married a pianist, Ekaterina Sergeevna Protopopova, from Moscow. She introduced him to the works of Schumann and Chopin. However, she suffered from bronchial asthma and due to harsh St Petersburg winters, she often had to stay in the warmer south, which was not only a high financial burden, but also a cause of different kind of trouble. They had no children of their own, but they adopted one.¹

Borodin died suddenly due to the rupture of aortic aneurism during a carnival dance on 27 February 1887.

Scientist

At the Military Academy of Medicine and Surgery in St Petersburg, Borodin was a brilliant student, he received his MD degree in 1858 and became Assistant Professor in Pathology. Then he was sent to Germany for postgraduate study in chemistry. There he met and later married Ekaterina.

Borodin was a postdoctoral fellow at the University of Heidelberg. He worked with Emil Erlenmeyer studying benzene derivatives and he spent some time in Pisa, working on halocarbons. Radical halo decarboxylation of aliphatic carboxylic acids was first demonstrated by Borodin in 1861 with his synthesis of methyl bromide from silver acetate. After three years of training in Western Europe (Germany, France, Italy), he became a Professor of Pathology at the Medical Academy in St Petersburg, where his expertise for experimental chemistry and teaching was highly regarded. In 1872, some of the chemical reactions were named after him. Borodin gained great respect in his profession by colleagues and was particularly known for his work on aldehydes.² Among other achievements in chemistry, there is the well-known Hansdicker-Borodin chemical reaction. He used to say that music is for him: "leisure, a kind of break from a more serious job". Hence, Borodin was seriously dedicated to scientific research.

Composer

In 1862, Borodin met Mily Balakirev, Cesar Cui, Modest Mussorgsky and Nikolai Rimsky-Korsakov and he became the last member of the Russian romantic musical composers group, later called the Mighty Five. Borodin was the amateur musician, like Mussorgsky and Rimsky-Korsakov. However, it is not clear how he managed to do both superior composing and his extensive academic work.³

Borodin is best known for his three symphonies, two string quartets and his opera *Prince Igor*. He began composing this opera in 1869 and worked on it for 18 years, but it was left unfinished. Alexander Glazunov and Nikolai Rimsky-Korsakov completed it.

In 1869, Balakirev conducted Borodin's first symphony and the same year, Borodin began to compose his opera *Prince Igor*, which includes the exceptional piece the *Polovtsian Dances*. His major compositions include: Symphony No 1 in E Major, Symphony No 2 in B Minor (*Valiant*), Symphony No 3 A Minor, symphonic poem *In the Steppes of Central Asia* (tone poem), opera *Prince Igor*, string quartets and songs. Borodin dedicated his famous String Quartet No 2 to his Ekaterina. The third symphony remained unfinished.

His Symphony No 2 in B Minor, completed in 1877, considered to be Russia's most beautiful symphony. Borodin had an extremely strong lyric vein and fine sense of rhythm. His lovely and melodious music reflects the properties of Russian folk melodies and listeners unfamiliar with Borodin will enjoy him. The new collectors should ignore the fact that some critics put the *Polovtsian Dances* in a "light" class. Like other composers of the Five, Borodin used striking harmonies unconventional in western European music. His acquaintance with Franz Liszt, a Hungarian composer, virtuoso pianist and conductor, contributed to the rapid spread of Borodin music to the West. On Liszt's initiative, Borodin's symphonies were performed several times in Germany and later on he travelled to Belgium (1885 and 1886), where his works also became popular.

His Second symphony in B minor is considered as one of the best works of the Russian symphonic music. The composer wrote it from 1869 to 1876, while he was working on the opera *Prince Igor* and he used some ideas originally consid-

ered for the opera in the symphony. As a result, it turned out that the symphony is very close to *Prince Igor* both in spirit and melody. The work glorifies the patriotism and power of the Russian people. It presents the routes from which Russia arose and the melodies present a kaleidoscope of history and give us the source of epic creativity of the Russians; so, it is no coincidence that the symphony was named, by others, the *Heroic*. However, the premiere of the Second symphony went unnoticed until 1880, when Franz Liszt organised a performance in Germany. Then Borodin became a famous composer outside of Russia.

The opera *Prince Igor*, including the exceptional *Polovtsian Dances* (Figure 1), is considered by many as Borodin most important work. It is an epic opera with historical content similar to Glinka's opera *Ruslan and Lyudmila*. The great ballet *Polovtsian Dances* in this opera is written on Eastern rhythms, mixed with the motif of the Old Slavic church song. The ballet can be performed as an independent piece. Also, the *Polovtsian Dances* and the *Polovtsian March*, from this

Figure 1: *Polovtsian Dances with Chorus* (No 17)

[a] Introduction: Andantino, 4/4, A major
[b] Gliding Dance of the Maidens: Andantino, 4/4, F# minor
[c + a] Wild Dance of the Men: Allegro vivo, 4/4, F major
[d] General Dance: Allegro, 3/4, D major
[e] Dance of the Boys and 2nd Dance of the Men: Presto, 6/8, D minor
[b' + e'] Gliding Dance of the Maidens (reprise, soon combined with the faster dancing of the boys): Moderato alla breve, 2/2, A major
[e''] Dance of the Boys and 2nd Dance of the Men (reprise): Presto, 6/8, D minor
[c' + a''] General Dance: Allegro con spirito, 4/4, A major

Themes from No 17

The image displays four staves of musical notation for themes from No 17. The first staff, labeled [a], is in treble clef, 4/4 time, A major, and begins with a piano (p) dynamic. It features a melodic line with slurs and a triplet of eighth notes. The second staff, labeled [b], is in treble clef, 4/4 time, F# minor, and begins with a piano (p) dynamic. It features a more rhythmic, eighth-note melody with slurs. The third staff, labeled [c], is in treble clef, 4/4 time, F major, and begins with a piano (p) dynamic. It features a rhythmic eighth-note melody with slurs. The fourth staff, labeled [c], is in treble clef, 4/4 time, F major, and begins with a piano (p) dynamic. It features a rhythmic eighth-note melody with slurs, similar to the third staff but with a different articulation.

"Prince Igor" is an opera in four acts with a prologue. The dances appear at the end of the act as an uninterrupted single number in several contrasting sections. Basic themes are identified by letters in brackets (eg [a]). Notable instrumental solos include those for clarinet (in No 8 and the Men's Dance [c]), oboe and English horn (in the Women's Dance [b]).

opera, can also be played at concerts in succession. The work has exceptional musical moments. The Broadway musical *Kismet*, produced 1953 by Rober Wright and George Forrest, adopted from the music of Alexander Borodin (Table 1) and won three Tony Awards for it.⁴

Table 1: Examples of the music in “Kismet” derived from Borodin’s music

Sands of Time
- from the <i>Steppes of Central Asia</i>
Fate
- from Symphony No 2, 4th movement, opening
Bazar of the Caravans
- from Symphony No 2, 4th movement, opening theme; <i>Prince Igor</i> , No 17; <i>Polovetsian Dances</i> , introductory theme
Stranger in Paradise
- <i>Prince Igor</i> , No 17; <i>Polovetsian Dances</i> (Gliding Dance of the Maidens)
He is in Love!
- <i>Prince Igor</i> , No 17, <i>Polovetsian Dances</i> (General Dance, D Major)
Night of my Nights
- <i>Serenade</i> , from <i>Petite Suite</i> for piano
And this is my Beloved
- <i>Prince Igor</i> , No 14 (Ovlur’s theme); String Quartet No 2, 3rd movement
Olive Tree
- <i>Prince Igor</i> , No 2

The plot of the musical film “Silk Stockings” starring Fred Astaire and Cyd Charisse uses the adaptation of a Russian composer’s works for a jazzed-up Hollywood musical and has been taken to be a reference to the adaptation of Borodin’s works to “Kismet”.

Critics and lovers of classical music often argue whether his masterpiece is *Prince Igor* or a short symphonic poem *In the Steppes of Central Asia*. The latter is an exquisitely perfect miniature written in 1880 and the composer described it the following way: *Through the silence of the steppes of Central Asia is heard the strain of a peaceful Russian song [solo clarinet]. Sounds of horses and camels come from the distance, approaching ever nearer [plucked strings], and with them the strains of a haunting Eastern melody [English horn]. A caravan is crossing the desert escorted by Russian soldiers [the Russian song is repeated by two horns and, as they near, by the full orchestra]. It progresses on its long journey confident in the protection afforded by the soldiers. The caravan disappears into the distant horizon. The song of the Russians blends with that of the Orientals in a common harmony [clarinets and cellos, then the strings – repeat the Eastern melody; the blending of the Russian and Oriental themes is soon heard – the Russian theme in violine and Oriental one in bassoons and horns], until both fade away from the plains.*

Comparison of Borodin music and scientific contributions

As an artist, Borodin achieved world fame. For his workload in chemistry research and improvements of medical education, he got recognition from his colleagues researchers and a few other professionals. Today, this scientific achievements are rarely mentioned in publications, only by historians of chemistry; in other words, Borodin as a researcher is practically forgotten.⁵ That is the reason why we would like to find out whether objective tools can be used to assess the value of scientific and artistic creativity, especially musical composing.

When in 1961, Eugene Garfield⁶ introduced citatometrics for scientific (*Science Citation Index*) and little later arts and humanism (*Arts and Humanities Citation Index*), it became possible to find out the citation frequency of each previous work, from the ancient time to date. In fact, the influence of previous works could be numerically established at current creativity of artists and scientists. Based on these data, the lists of most cited authors are occasionally made. In such lists, the artists and philosophers from the various fields of art and humanism, eg, Homer, Aristotle, Dante, Seneca, Descartes are far more often quoted than well-known scientists, such Antoine Lavoisier, Rudolf Virchow, Louis Pasteur and Robert Koch.

This huge difference between citations of writers and scientists stems from the fact that arts and humanity study properties of man which have not changed much from the age of Homer to present days. Homer studied and described love, marriage, children, infidelity, beliefs, good deeds, war, courage, death, hatred, theft, fraud and other phenomena that are still encountered today. In contrast, science studies nature often within biology, chemistry and physics. Biologists study all living things, chemists study the properties of substances and how they react with each other and physicists study all forces. This is why scientists add new knowledge to the existing one and each contribution is built like a brick into a wall of knowledge. A scientist most often relies on his/her immediate predecessors, while the artists often find inspiration both in works of old and contemporary writers and philosophers. In fact, the scientists from the distant past are only mentioned in rare historical papers or textbooks.

The question is can the musical works and their composers be quantified like other types of artists, writers and philosophers? Can we objectively compare Symphony No 2 in B Minor (A Borodin) and Symphony No 2 in D Major (L van Beethoven)? Citation metrics do not have a parameter to be used in order to identify which music is better, or is one composer greater than the other and there is no way to determine which of the two pieces of music sounds better. The only determining factor for the quality of mentioned pieces is the listener's reaction. This reaction is

distinctly subjective; and if one claims that his decision is more correct than of the other, it does not present an objective evaluation. Likewise, to identify which music is the greatest, or which composer is greater than the other is not possible to determine objectively. Citation metrics do not help us to judge the quality of music; there are only objective ways to determine what kind of music people love. When one judges a composer, his diversity of output is an objective factor that shows if a composer is great.

Conclusion

In conclusion, Borodin made several significant discoveries in chemistry and toxicology and did superb teaching medical students; he also created three best symphonies, two string quartets, the *Prince Igor* opera and several other compositions. In his short life, he was doing what he loved to do and he did not care how long his accomplishments would be remembered. Anton Pavlovich Chekhov nicely stated about it⁷ in his *Uncle Vanya* play:

Astrov: Those who will live in hundred, two hundred years after us, to whom we are clearing the road, will they mention us with a good word? Are they going to forget us?

Marina: People will forget us, but God won't.

A look at Borodin life encourages us to think about our own. We may sometimes ask ourselves what is the purpose of life.⁸

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Conflict of interest

None.