Harmonic qualities
as key to Scriabin's late harmonic practice

Jason Yust and Thomas Noll

Outline

- **Harmonic qualities and the DFT: Hexatonic, Octatonic, Diatonic, and Whole-tone**
- **The Mystic chord, tonality, and the DFT**
- **Octatonicism and Diatonicism, Local and Global**
- **Examples:**
  —Op. 11
  —Op. 35 no. 2
  —Op. 59 no. 2
  —Op. 74 nos. 1 and 2

DFT and Harmonic Qualities

DFT on pc-vectors and harmonic quality: References

Lewin, David (1959). “Re: Intervallic Relations between Two Collections of Notes,” *JMT* 3/2.

——— (2001). “Special Cases of the Interval Function between Pitch Class Sets X and Y.” *JMT* 45/1.

Quinn, Ian (2006–2007). “General Equal-Tempered Harmony,” *Perspectives of New Music* 44/2–45/1.

Callender, Cliff (2007). “Continuous Harmonic Spaces,” *JMT* 51/2

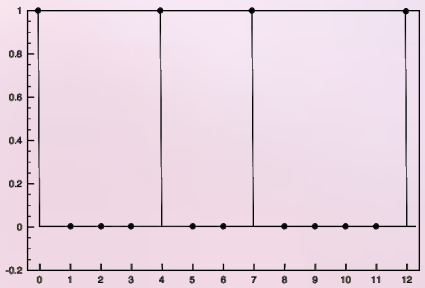
Amiot, Emmanuel (2007). “David Lewin and Maximally Even Sets.” *Journal of Mathematics and Music* 1/3.

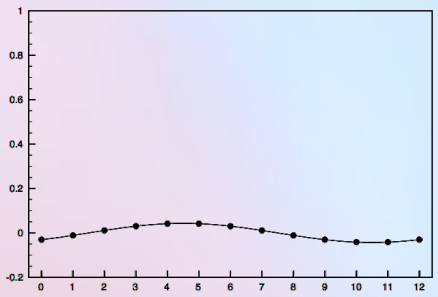
——— (2016). *Music Through Fourier Space: Discrete Fourier Transform in Music Theory.* (Springer)

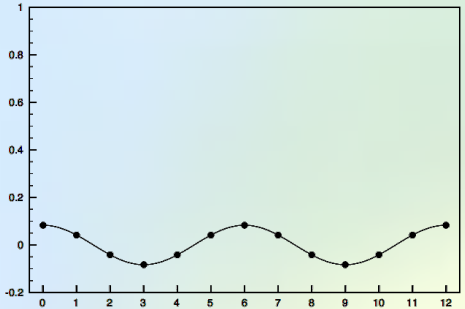
Yust, Jason (2015). “Schubert’s Harmonic Language and Fourier Phase Spaces.” *JMT* 59/1.

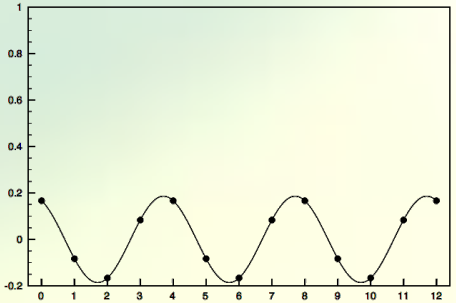
——— (2016). “Special Collections: Renewing Forte’s Set Theory.” *JMT* 60/2.

C major triad = F_0 + F_1 + + F_2 F_3

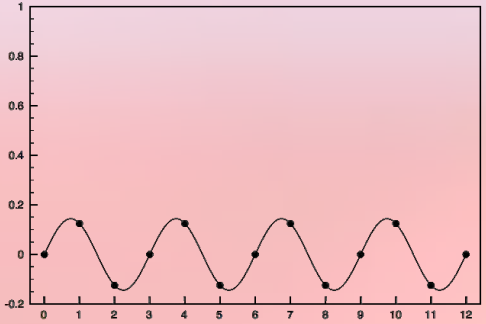


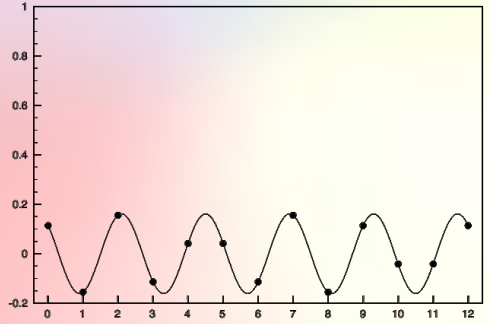


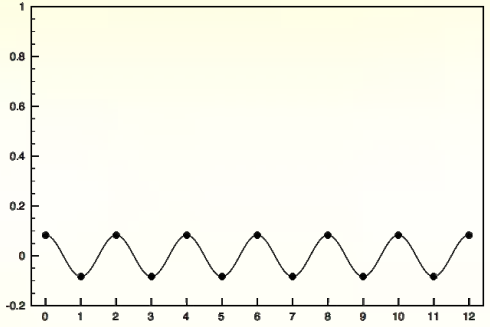




+ F_4 + F_5 + F_6

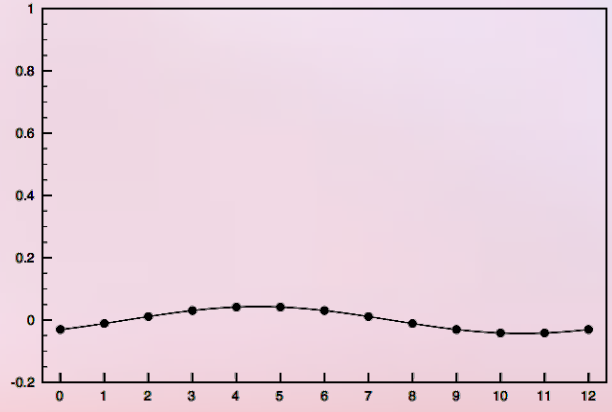




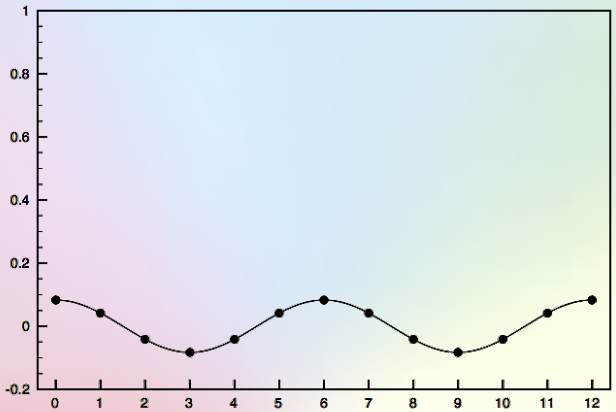


The DFT is a **lossless transformation** from a pitch-class vector to a sum of **periodic functions** dividing the octave into 1–6 parts.

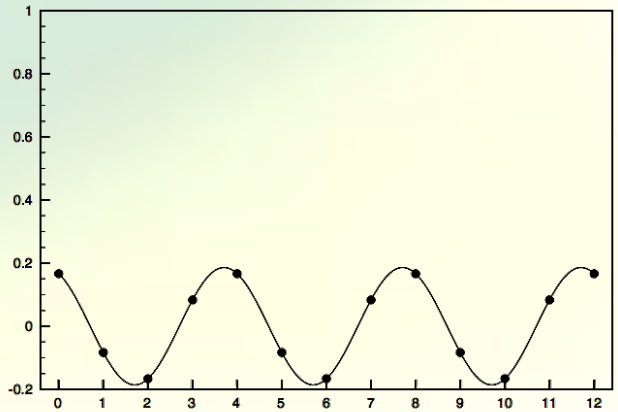
Harmonic qualities



F_1 represents a concentration of pitch-class weight on the full pc circle.

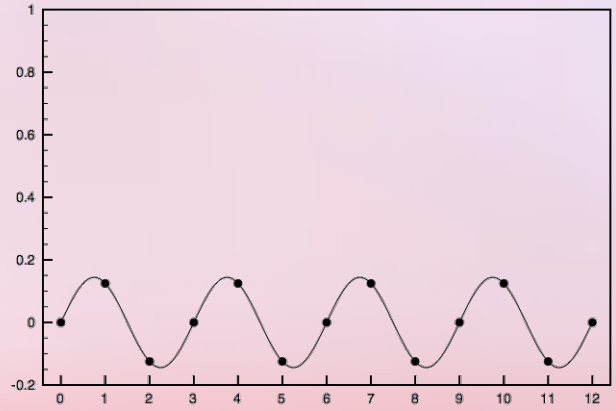


F_2 represents a concentration of pitch-class weight on a half-octave (tritone) cycle.

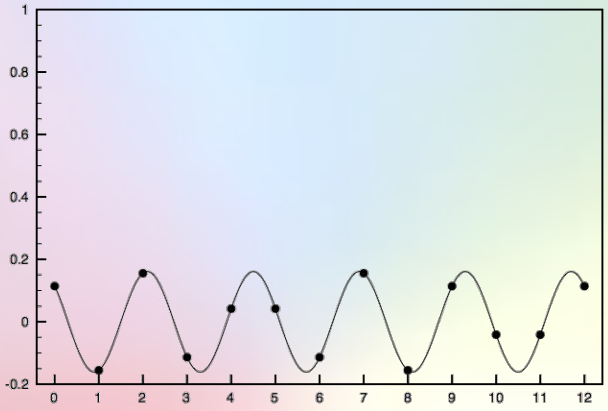


F_3 gives the weighting on the nearest *augmented triad* or ***hexatonic*** *scale*.

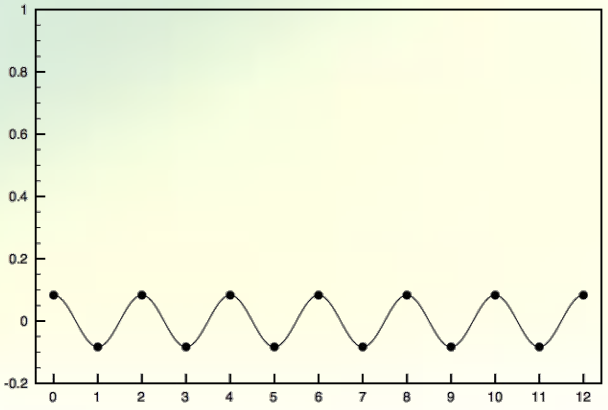
Harmonic qualities



F_4 gives the weighting on the nearest *diminished seventh* or ***octatonic*** *scale*.



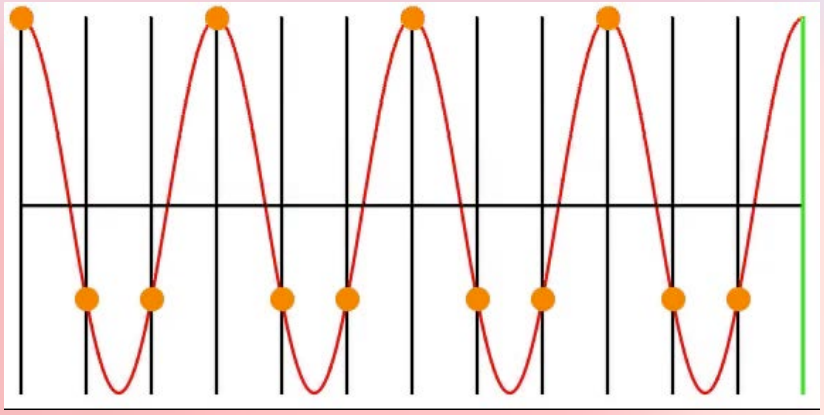
F_5 give the balance on the ***circle of fifths***



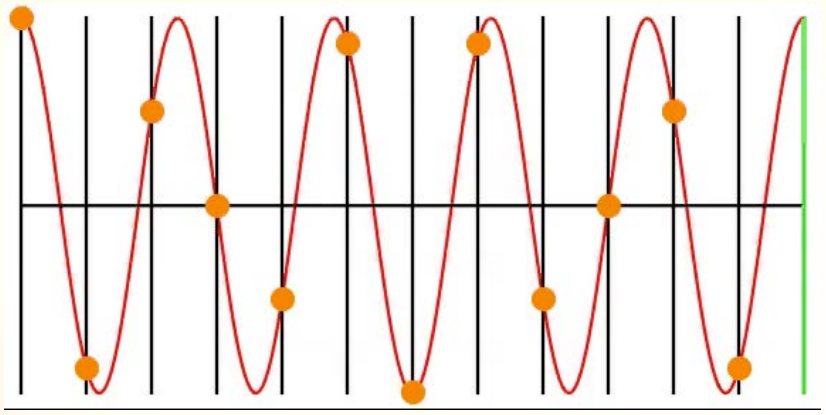
F_6 gives the relative weighting on the two ***whole-tone*** collections.

Phases

Continuous Phase-Shift
of the 4th Partial

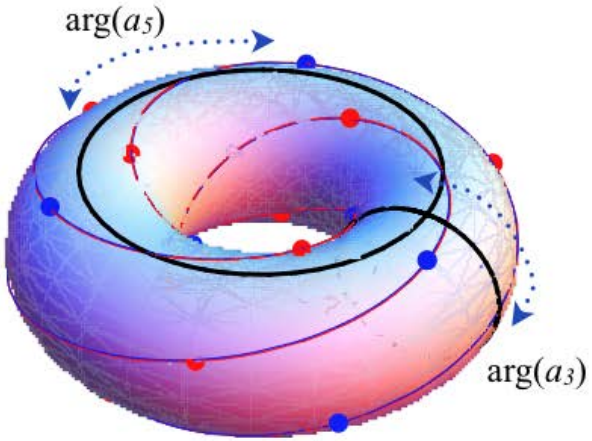


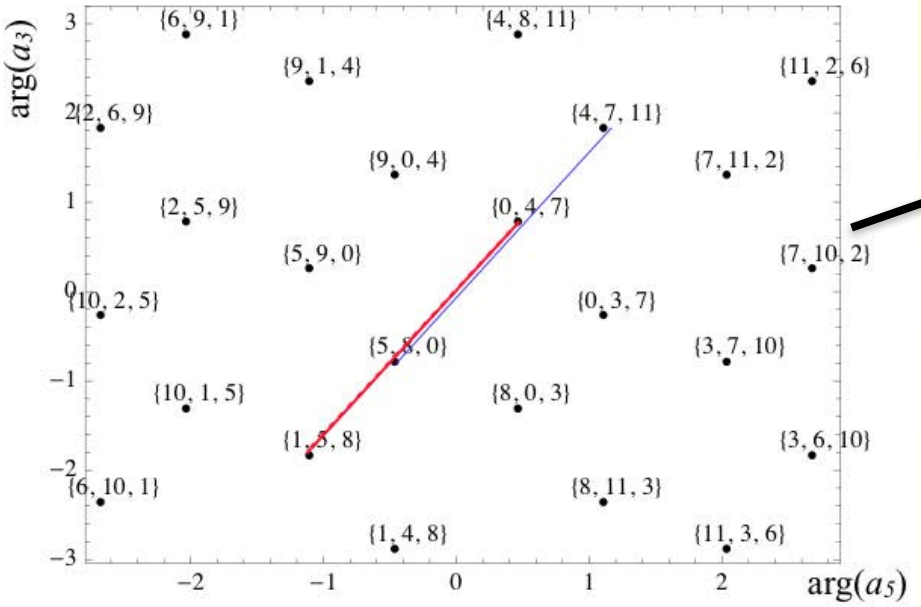
Continuous Phase-Shift
of the 5th Partial



Phase spaces

A **phase space** is a toroidal space where the axes are phases of two (or any number) selected DFT coefficients.

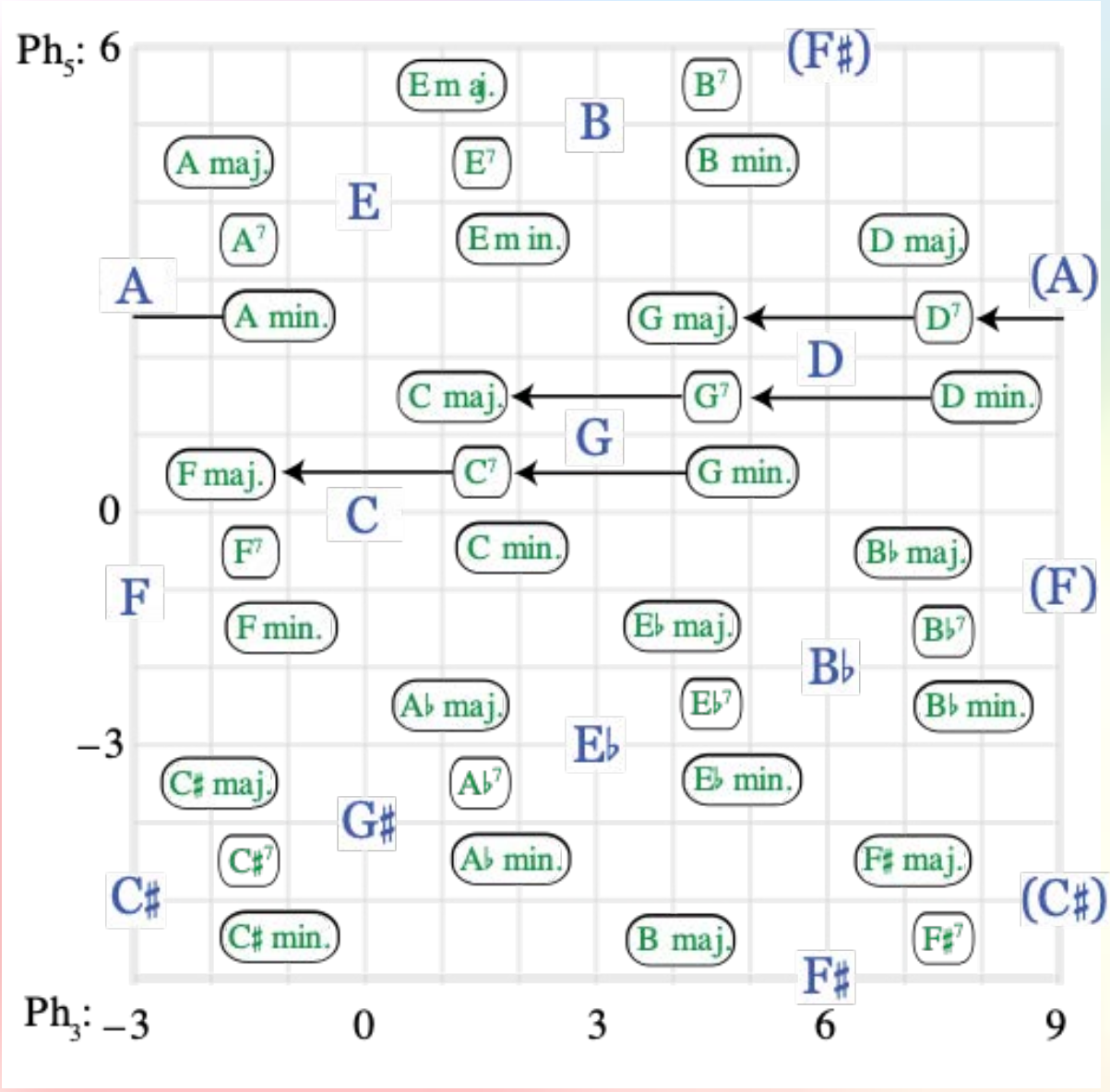




from Amiot, MCM 2013 proceedings

The Mystic Chord

From the tonal period to *Prometheus*

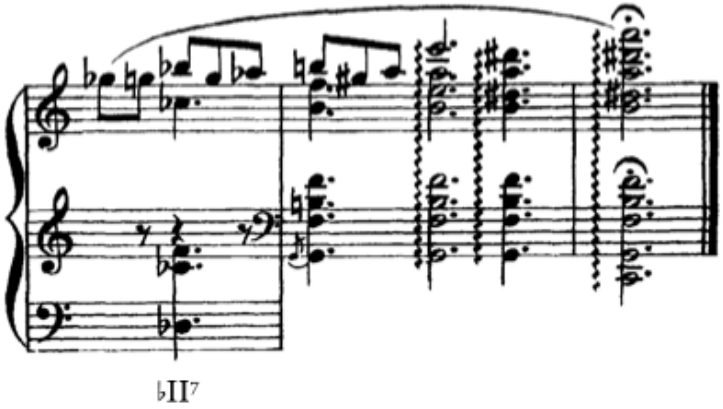


Simple tonal functions are represented by positions in a phase space on two *odd* DFT coefficients, f_3 and f_5 (equivalent to Krumhansl-Kessler space—see Krumhansl 1990, *Cognitive Foundations of Musical Pitch*).

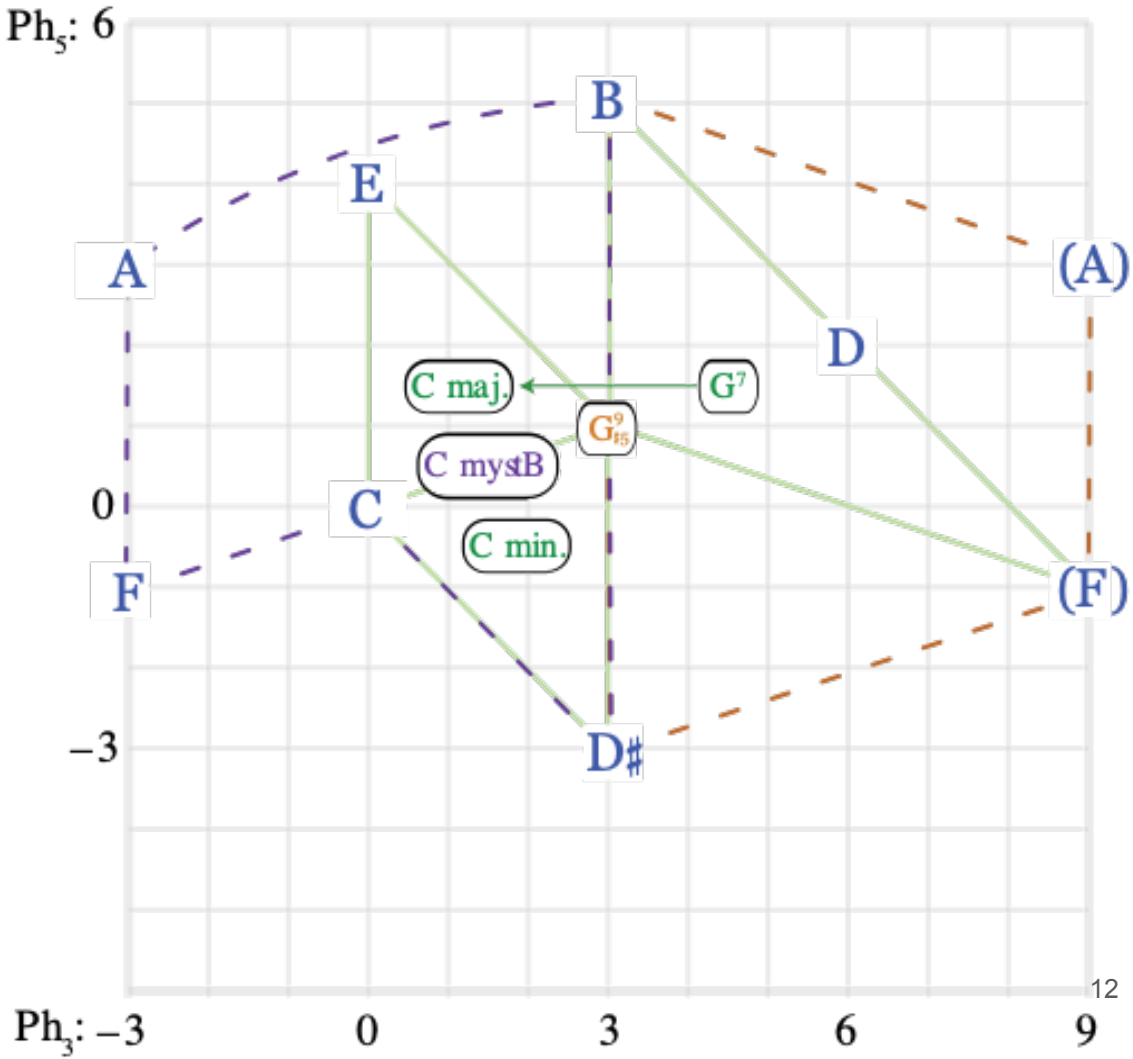
Vertical (Ph_5) positions correspond to keys

Horizontal (Ph_3) positions correspond to basic functions, subdominant, dominant, tonic, represented by ii, V^7, and I chords.

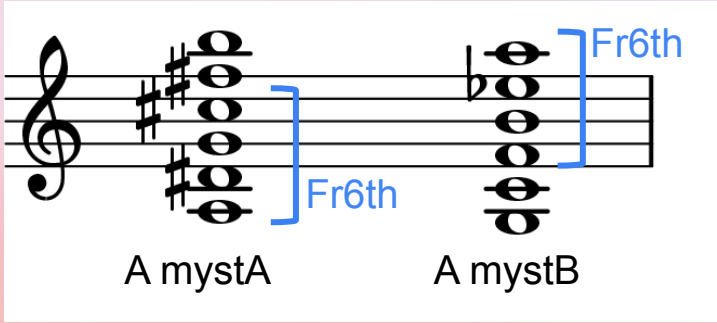
The Mystic chord first appears in tonal contexts. This example from Op. 57/1, “Désir,” is cited by Philip Ewell (2002) (“Scriabin’s Seventh Piano Sonata: Three Analytical Approaches,” *Indiana Theory Review* 23).



The chord is aligned with tonic, between major and minor. The tritones BF and AD# cancel out for odd-numbered coefficients, making the chord weak in this space.

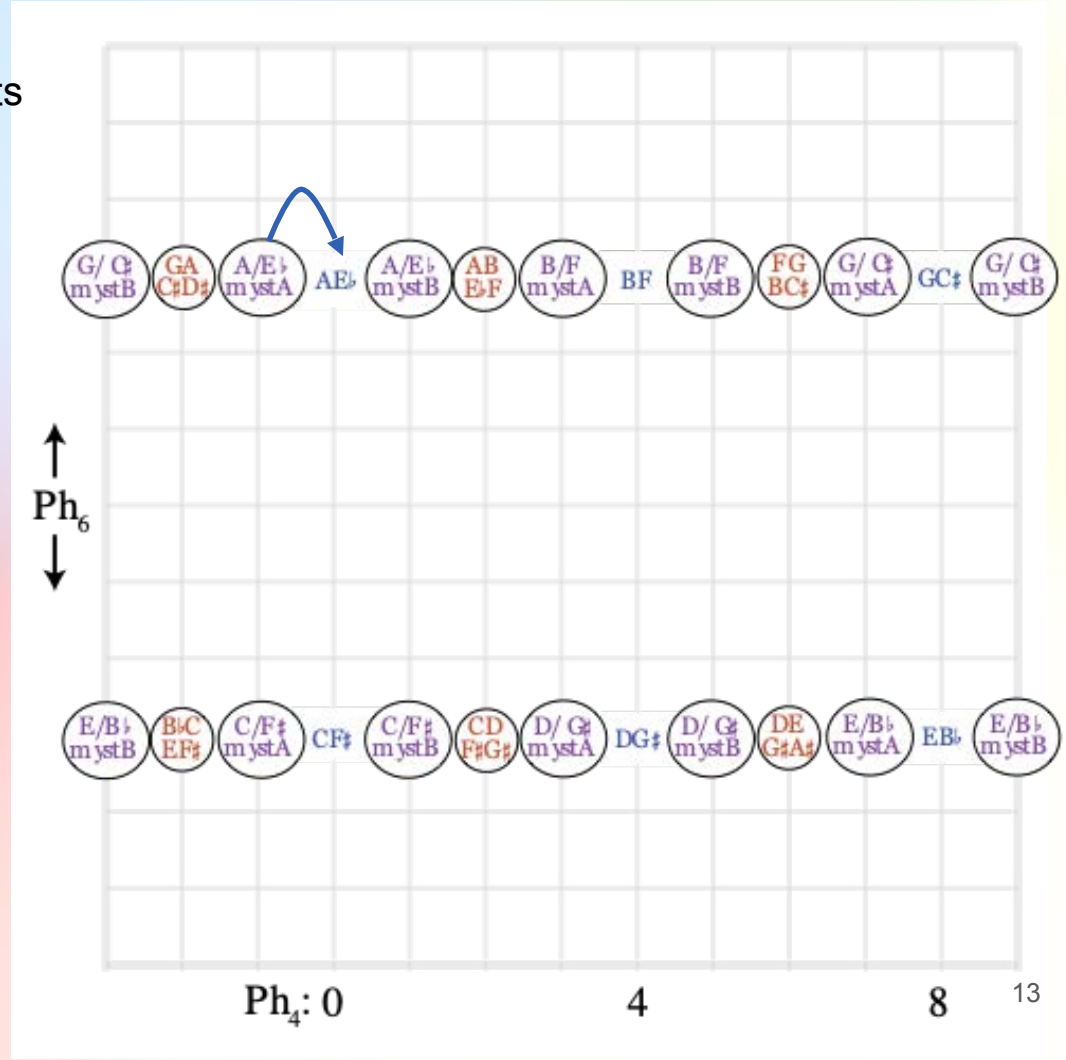


The weakness of the chord in the traditional tonal-functional space is complemented by its strength on even-numbered coefficients, f_4 and f_6. In the later non-tonal music, like *Prometheus*, these even-numbered coefficients take over the tonality-defining role.



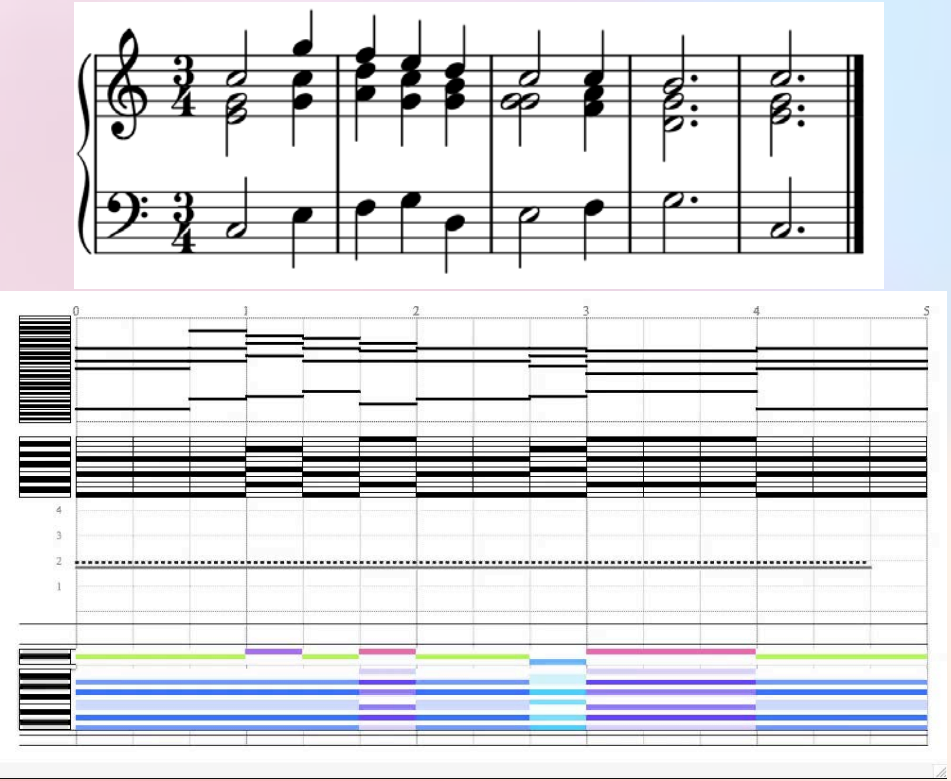
Hence Scriabin's claim that the chord on the left (from *Prometheus*) represents the tonality of A.

The tonality-determining element is now the Fr6th (whole-tone/octatonic) subset, rather than perfect 5th.

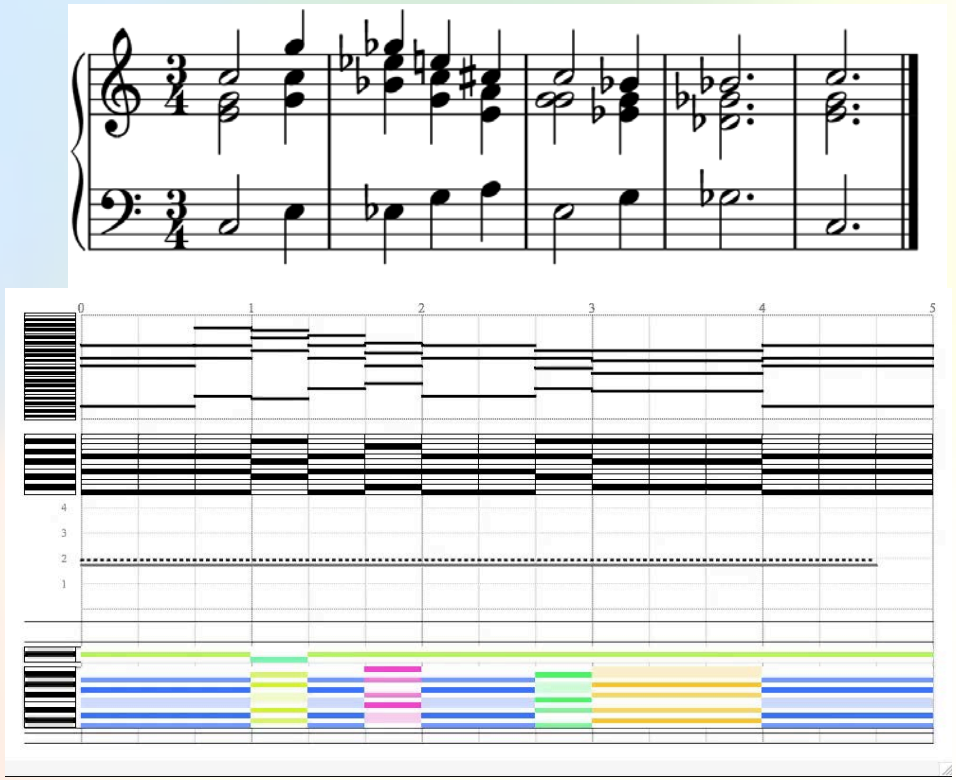


Octatonicity and Diatonicity

Simplified examples of diatonicity and octatonicity



Conventional tonal progression
Locally triadic, globally diatonic



Octatonic progression
Locally triadic, globally octatonic

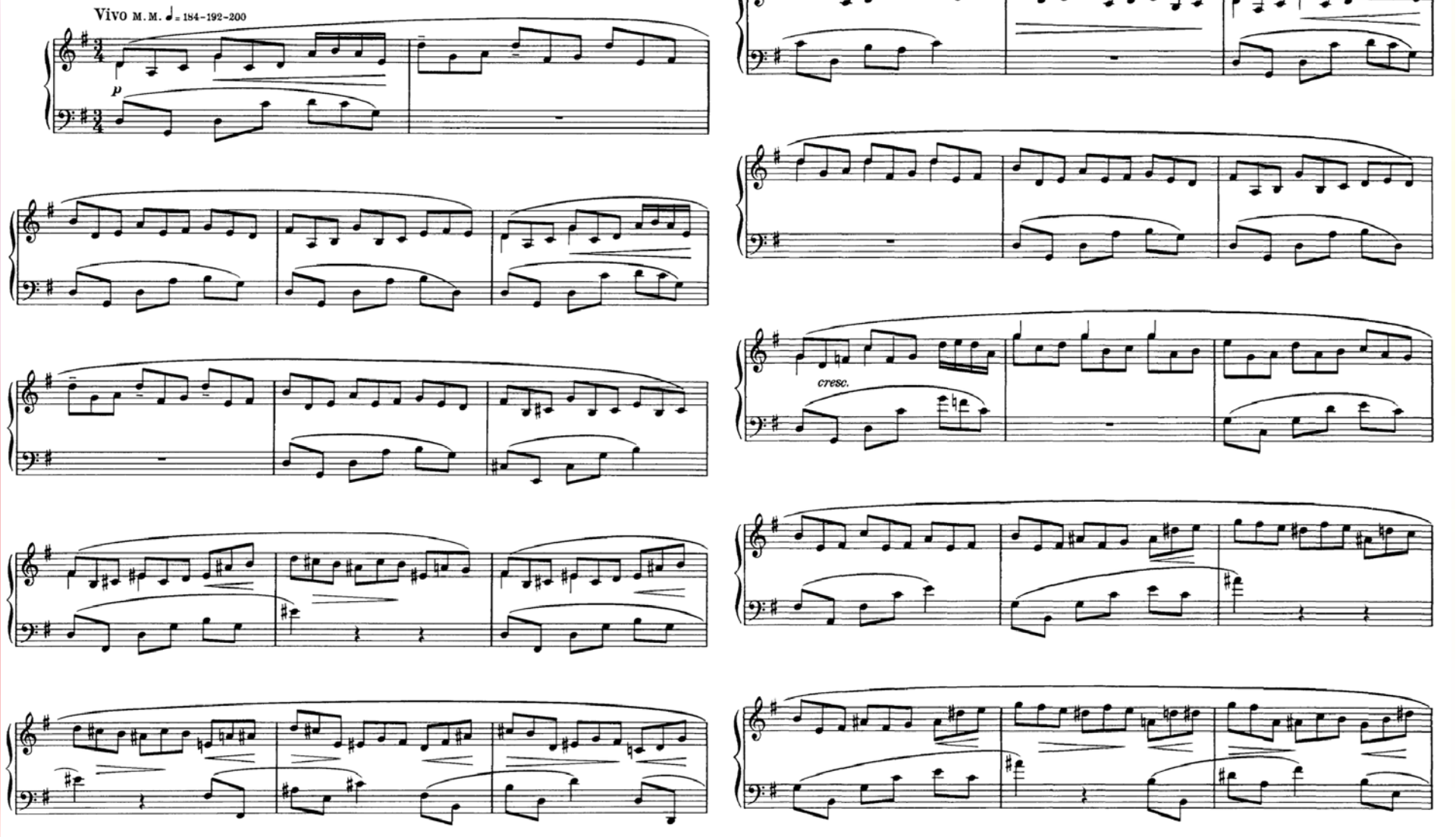
Gray line: $|f_4|$, Dotted line: $|f_5|$
Below: Colors correspond to phase values

Examples

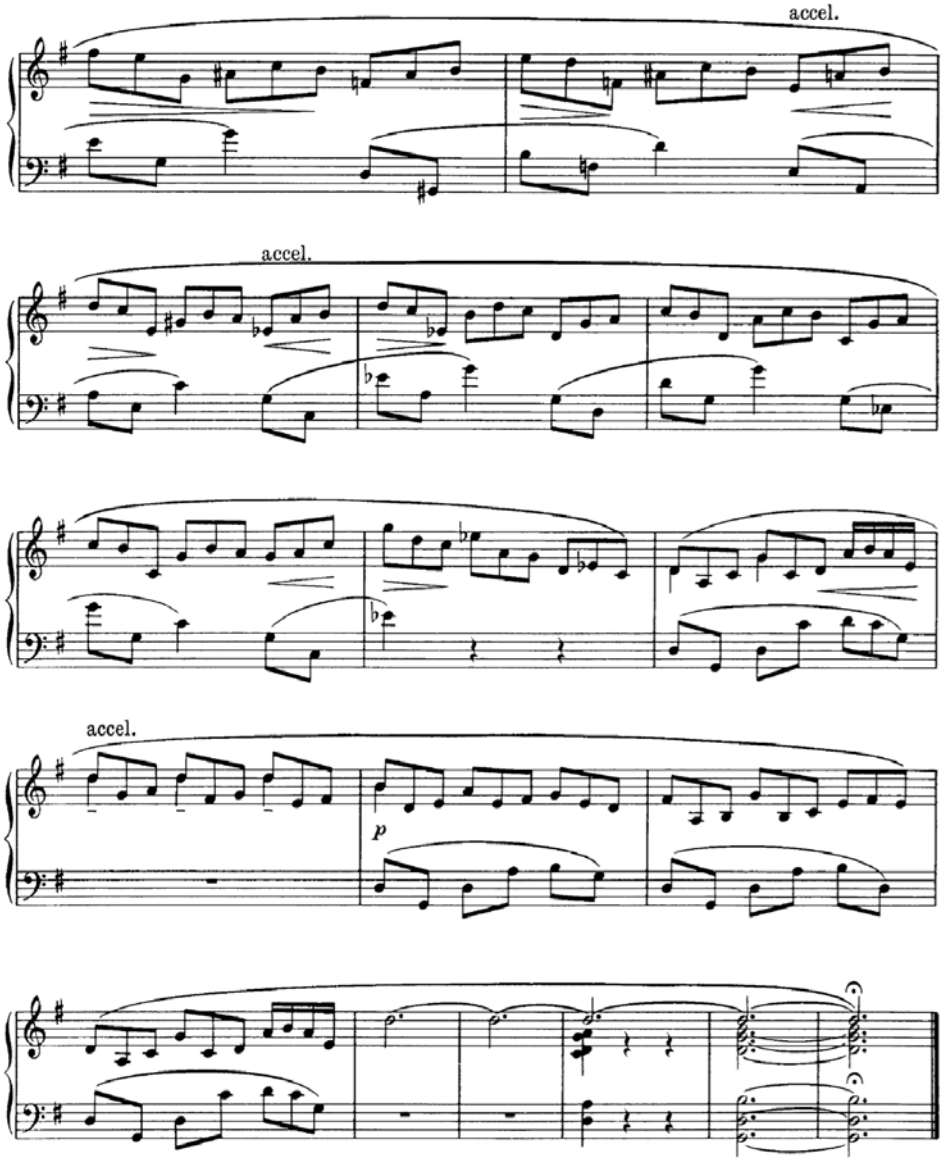
Op. 11/ 3,4
Op. 35/2
Op. 59/2
Op.74/1-5

Op.11/3

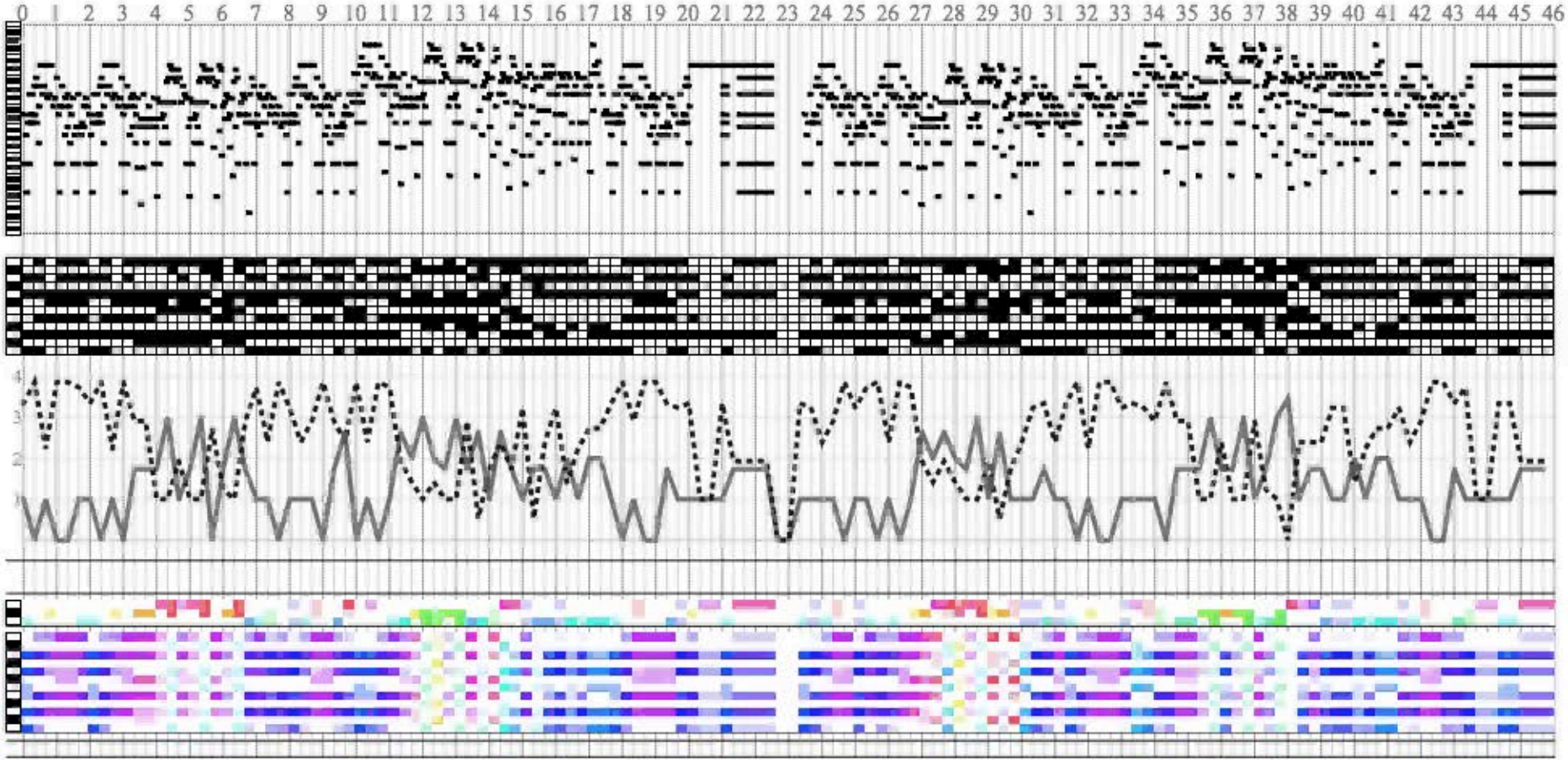
3.



Op.11/3



Op.11/3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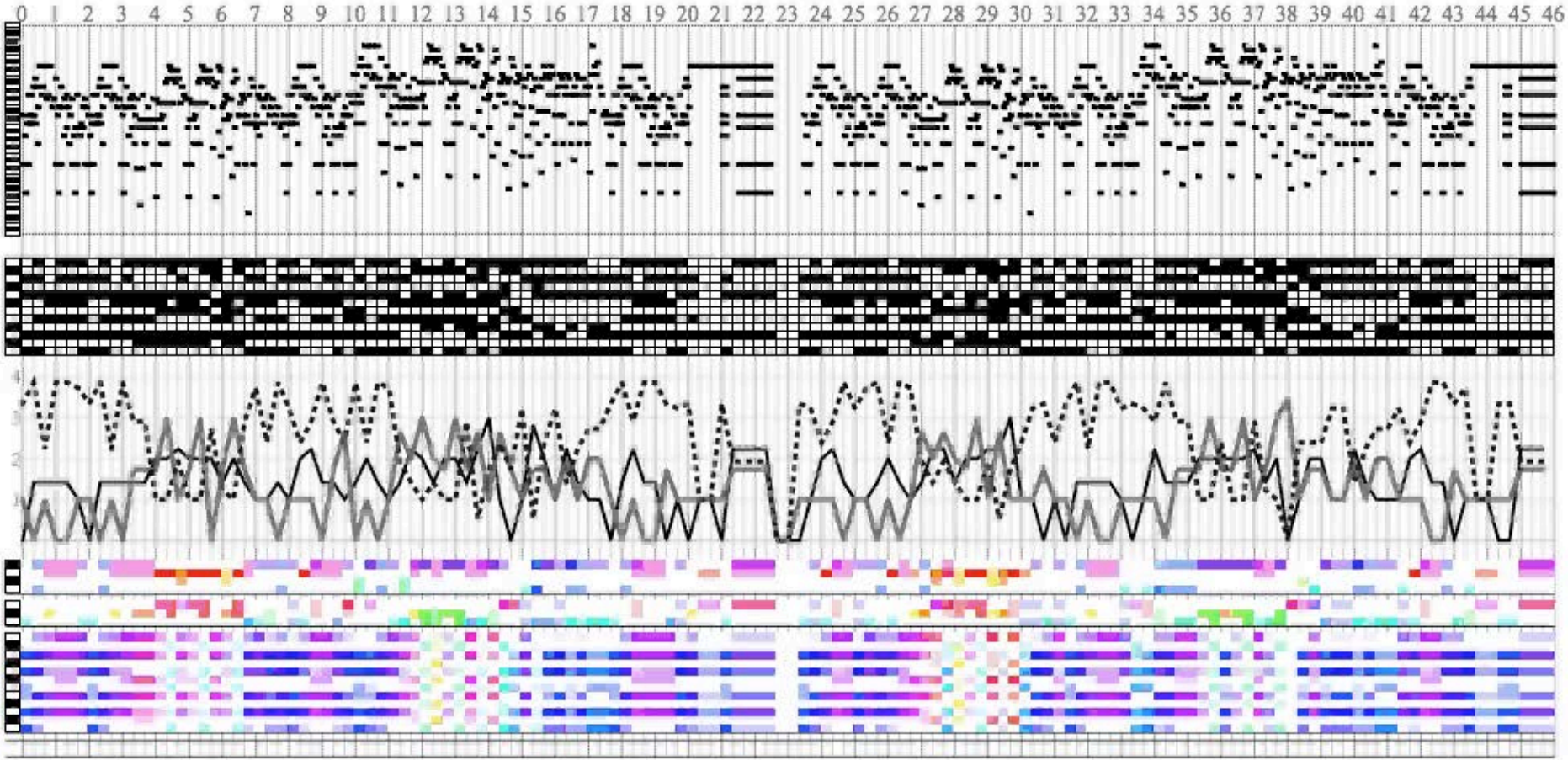
Op.11/3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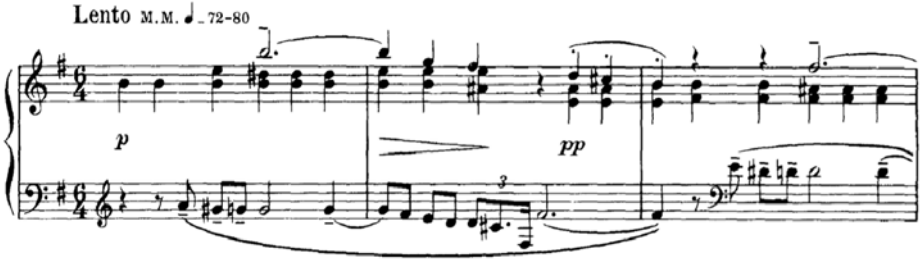
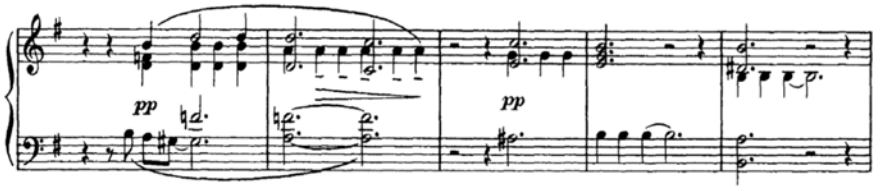
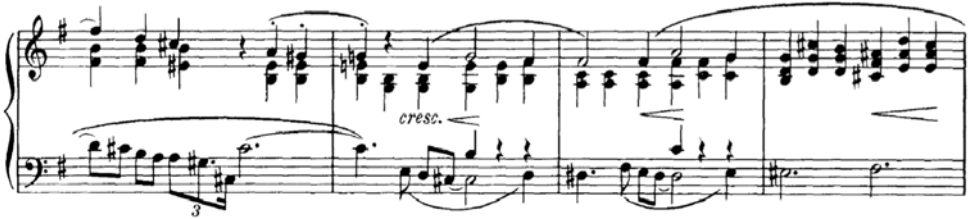
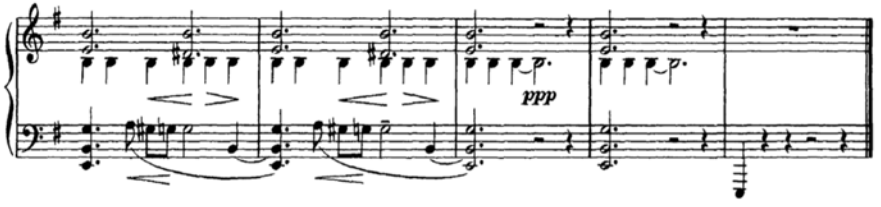
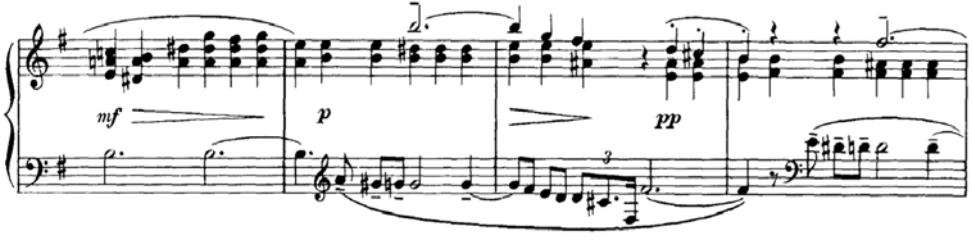
Op.11/4

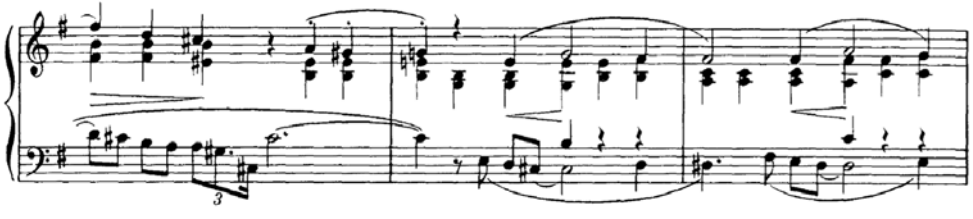




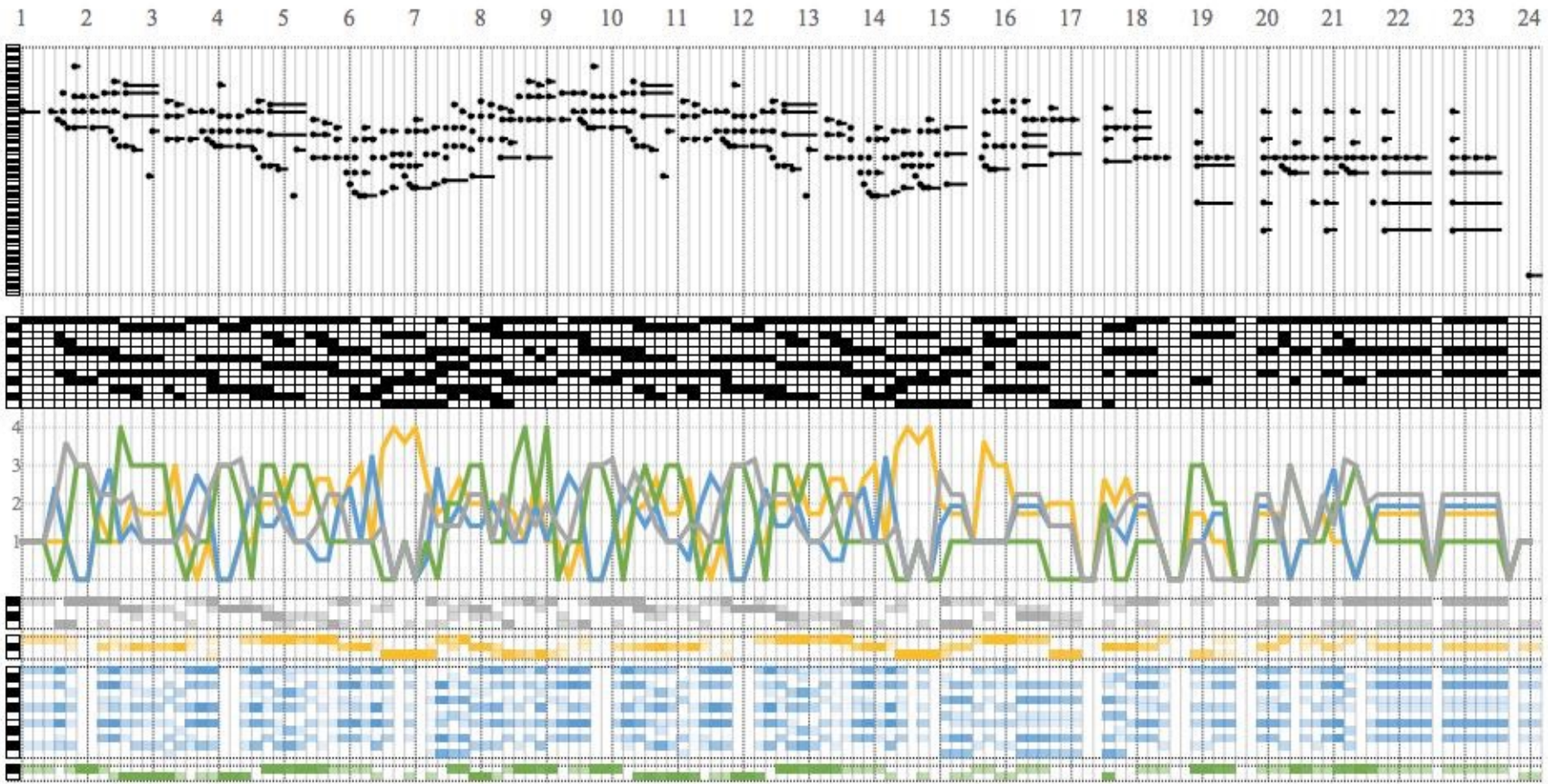




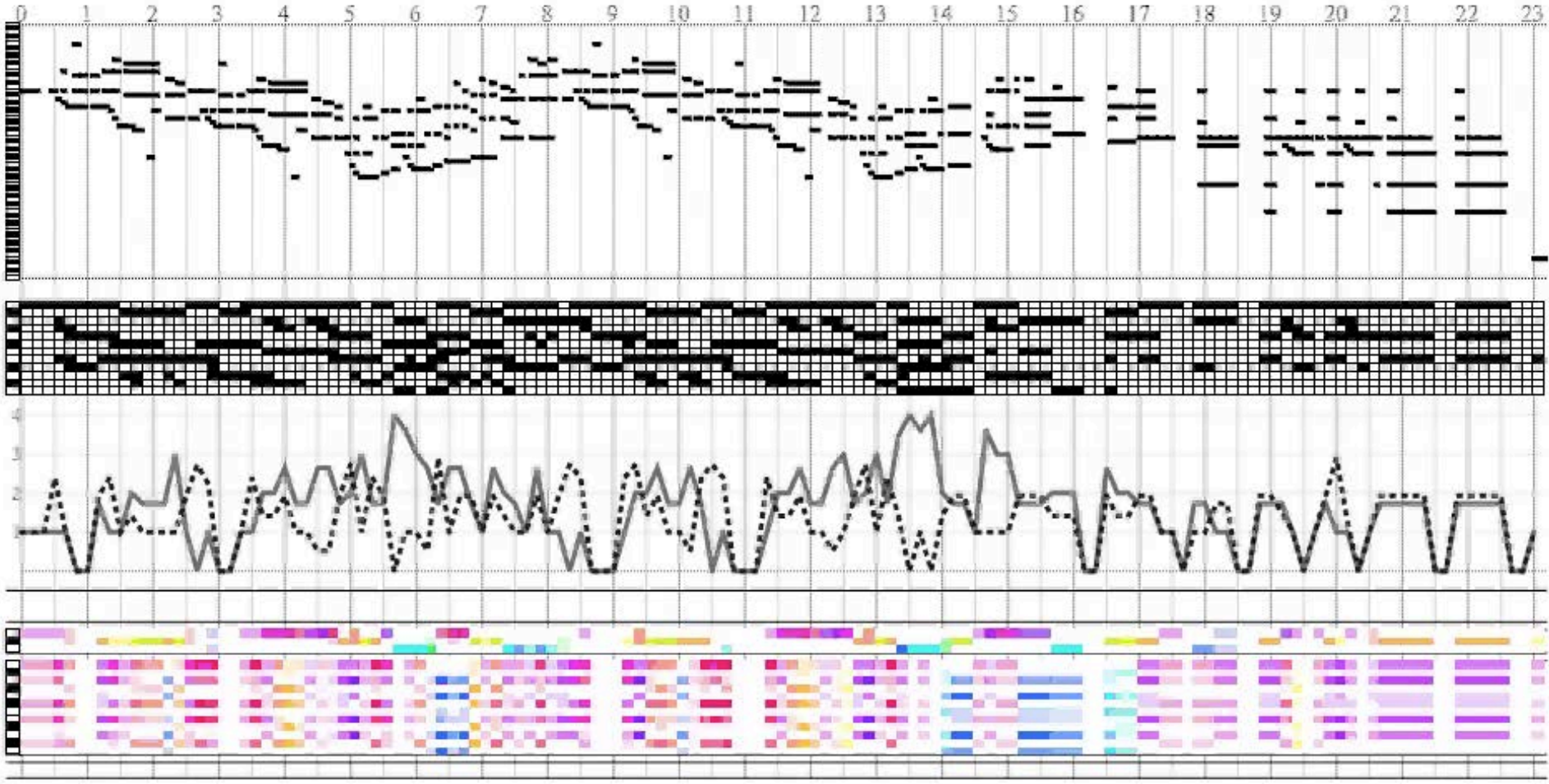




Op.11/4



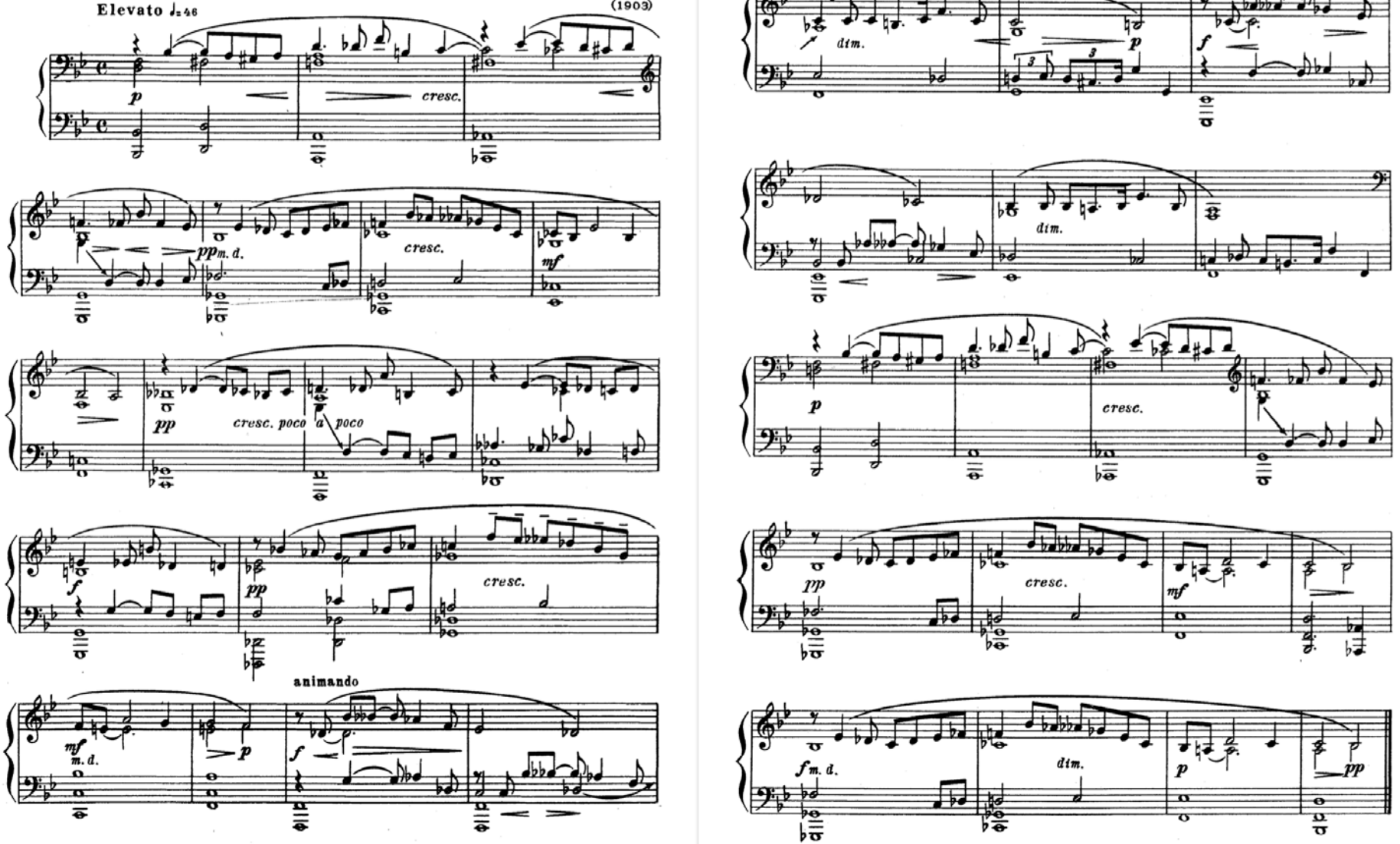
Op.11/4



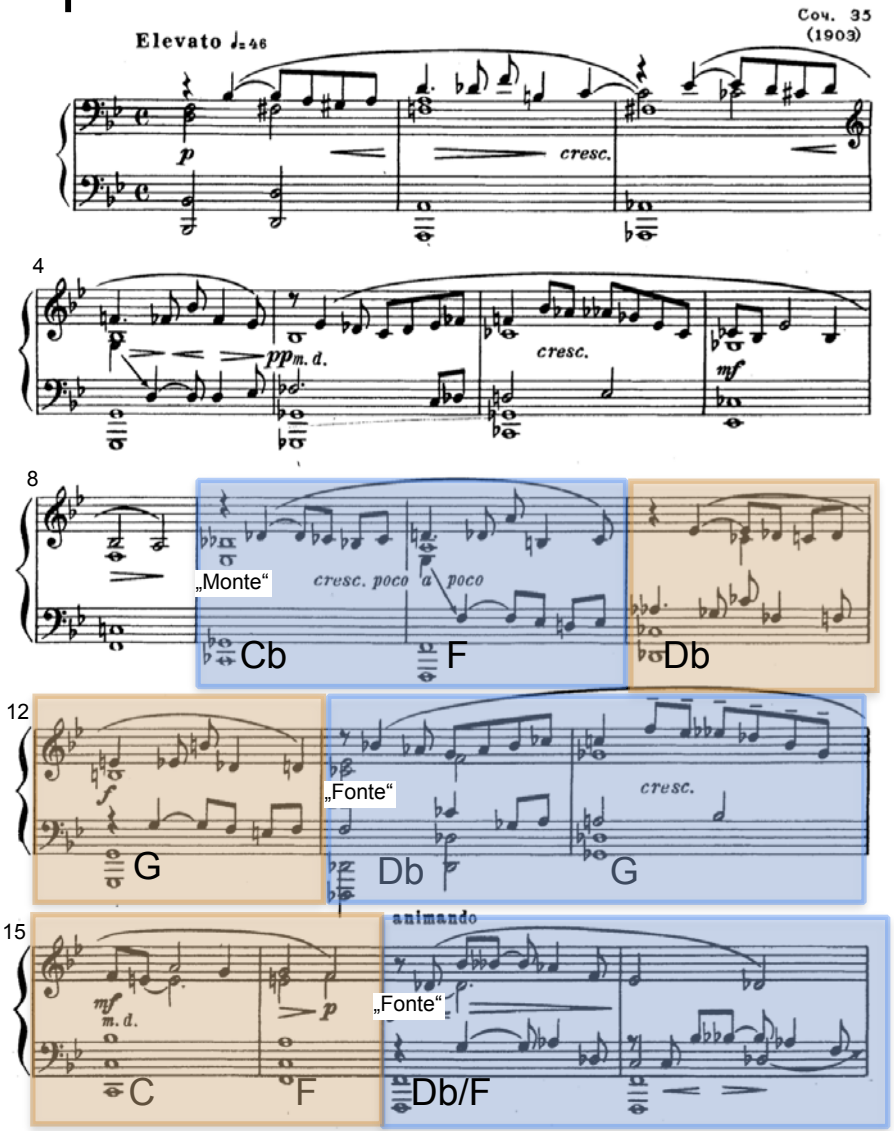
Op. 35/2

№ 2

Соч. 35
(1903)



Op. 35/2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(1903)
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Db
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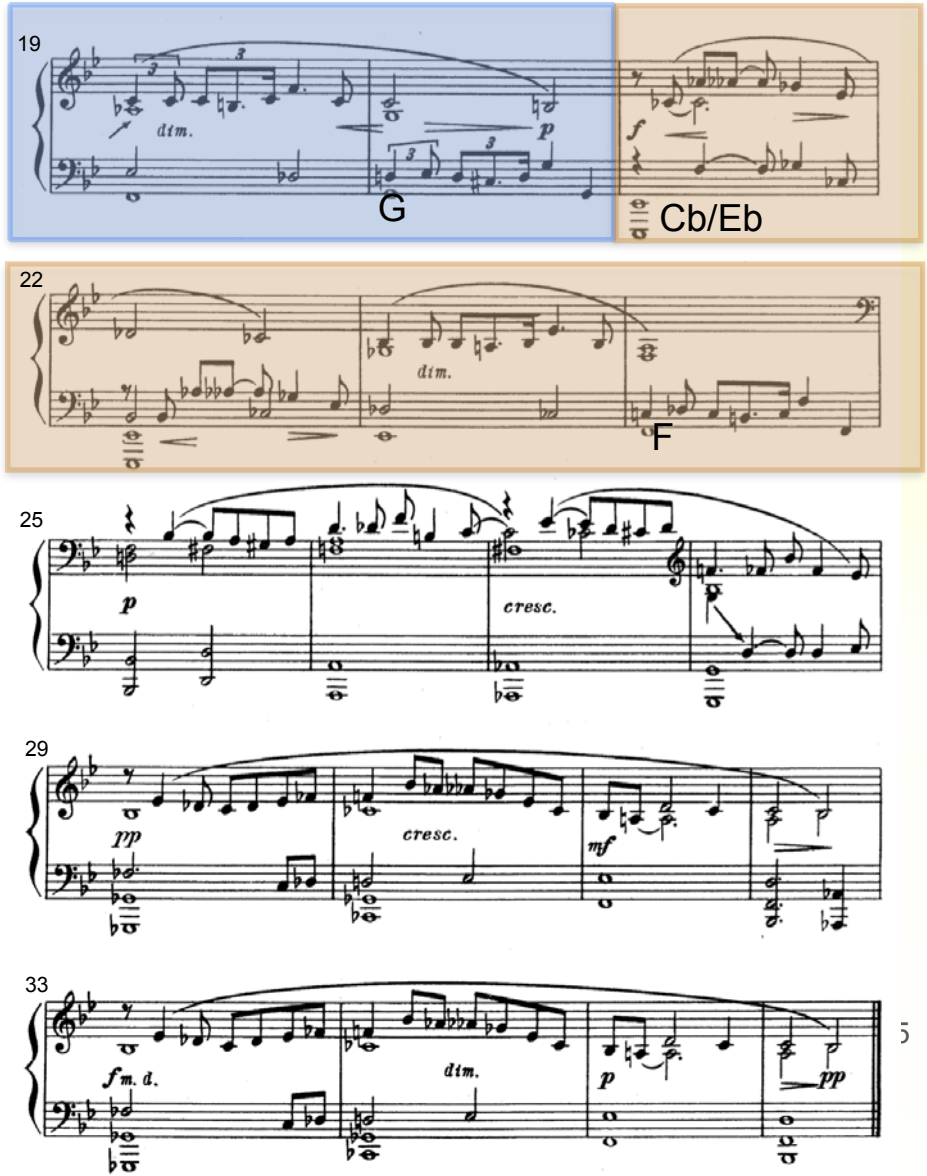
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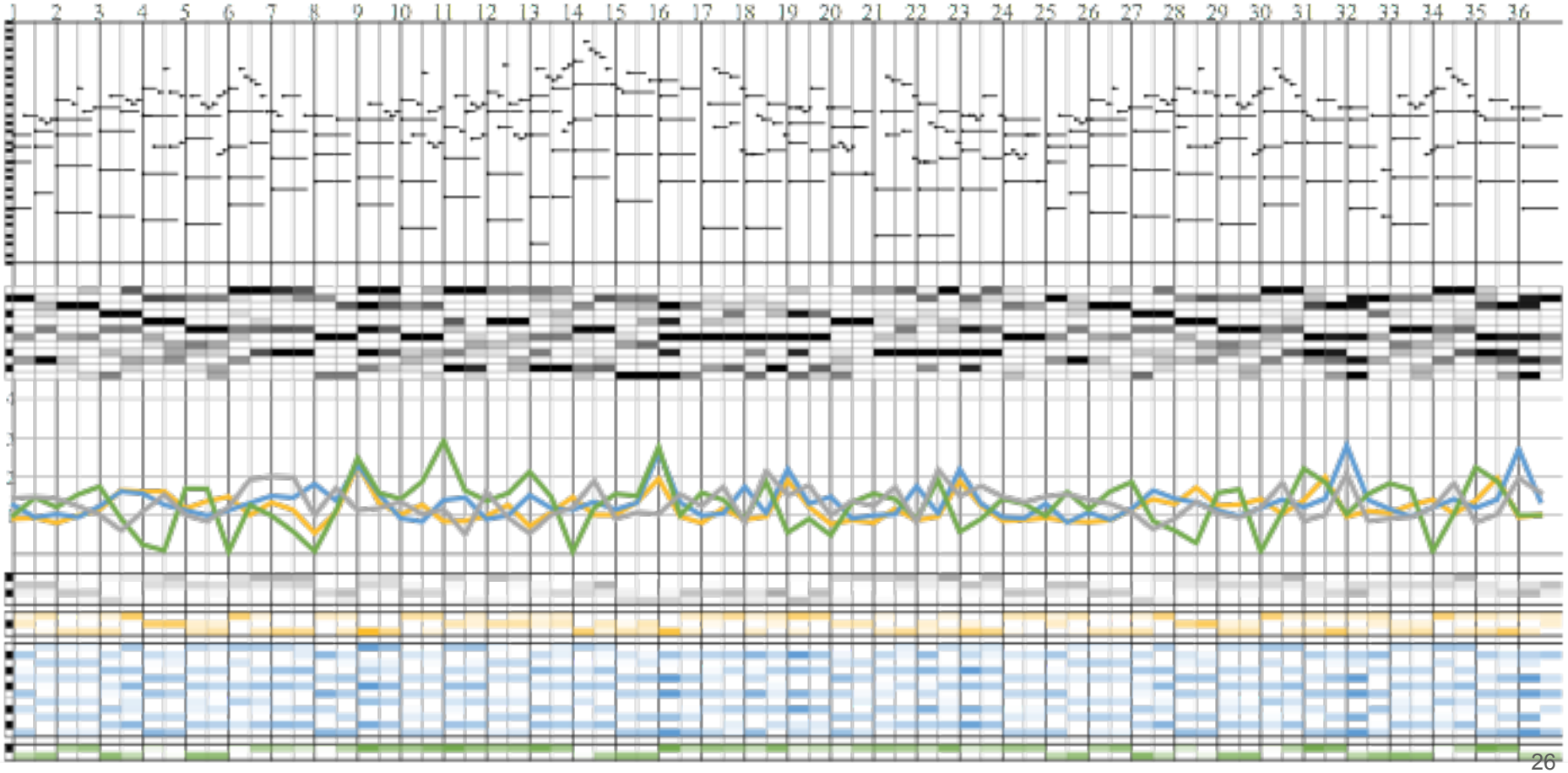
Op. 35/2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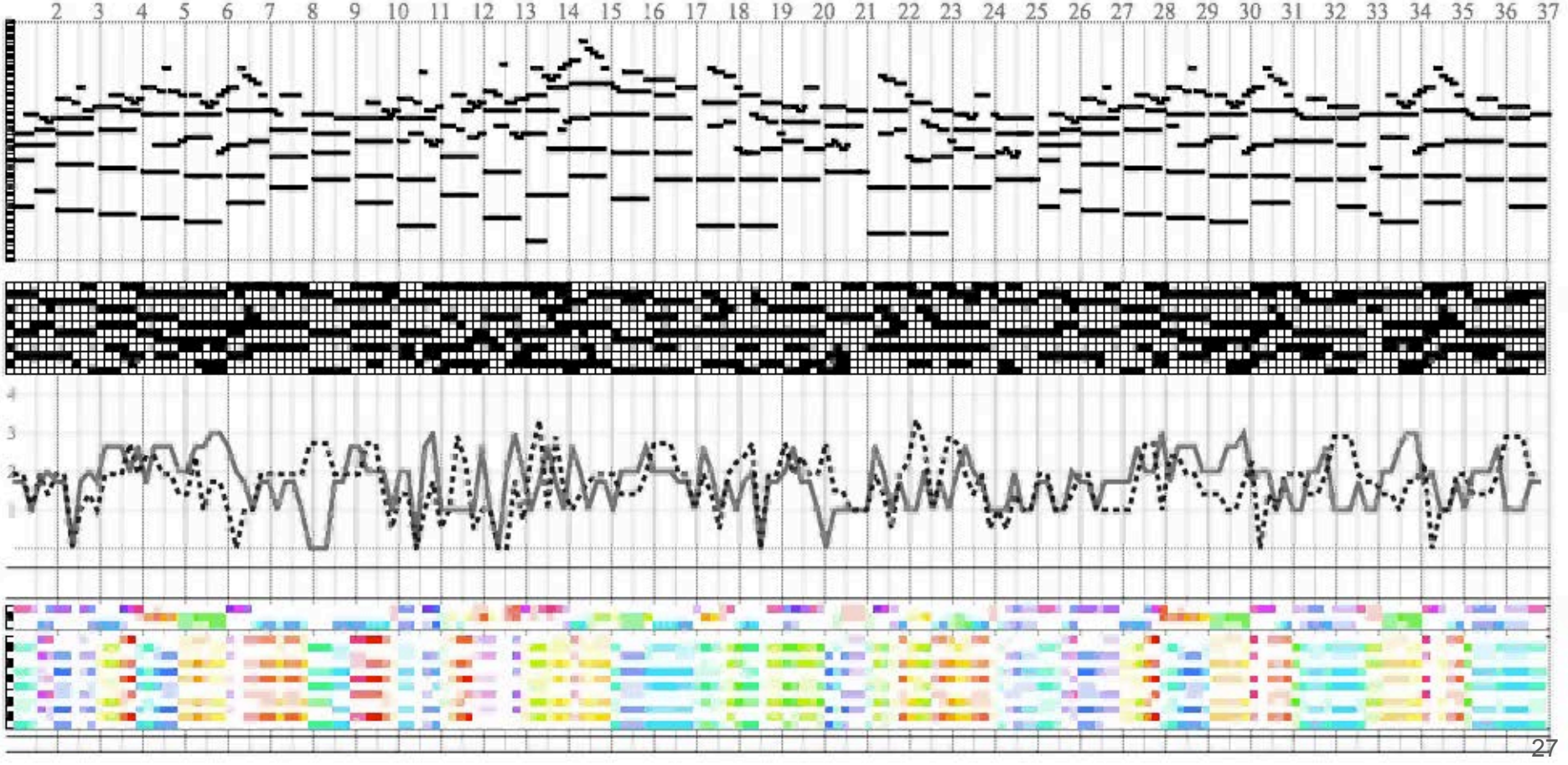
Op. 35/2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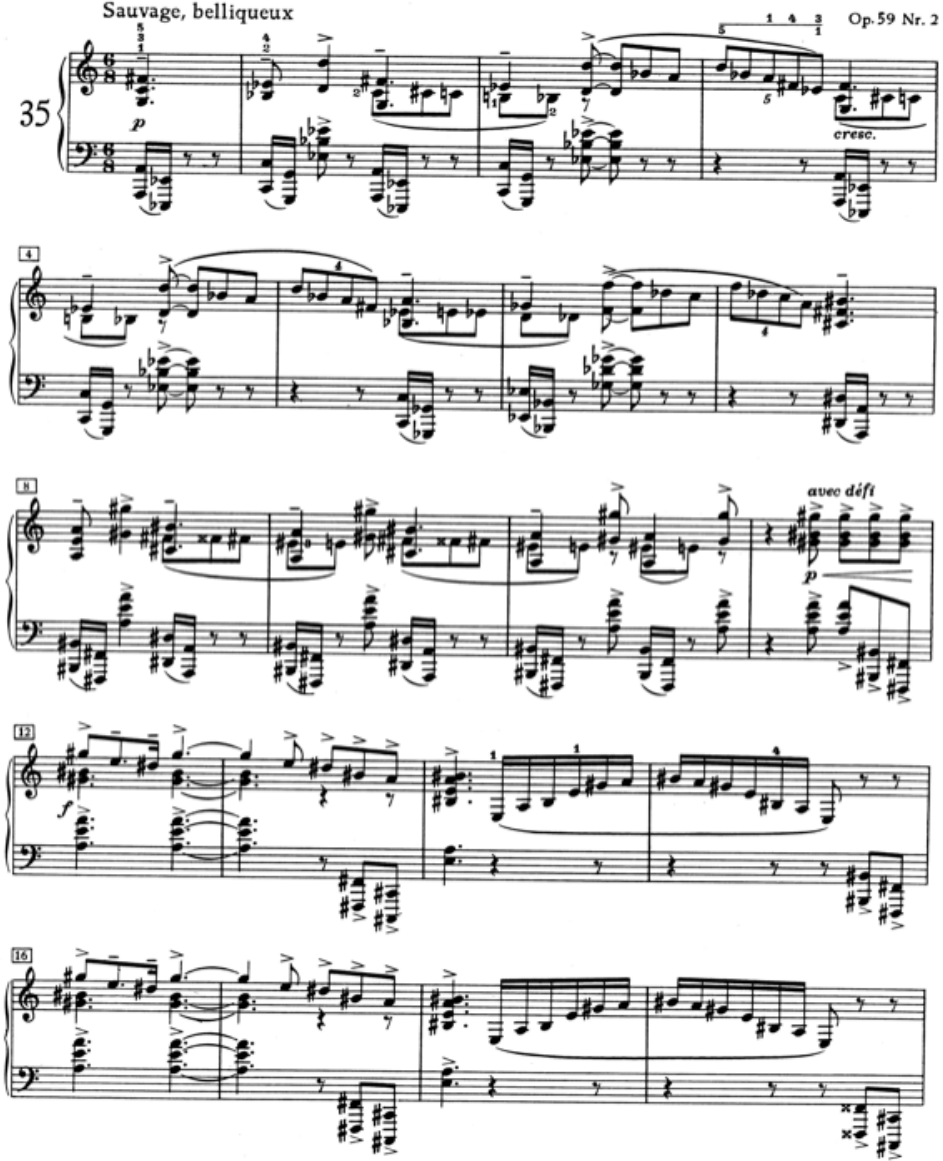
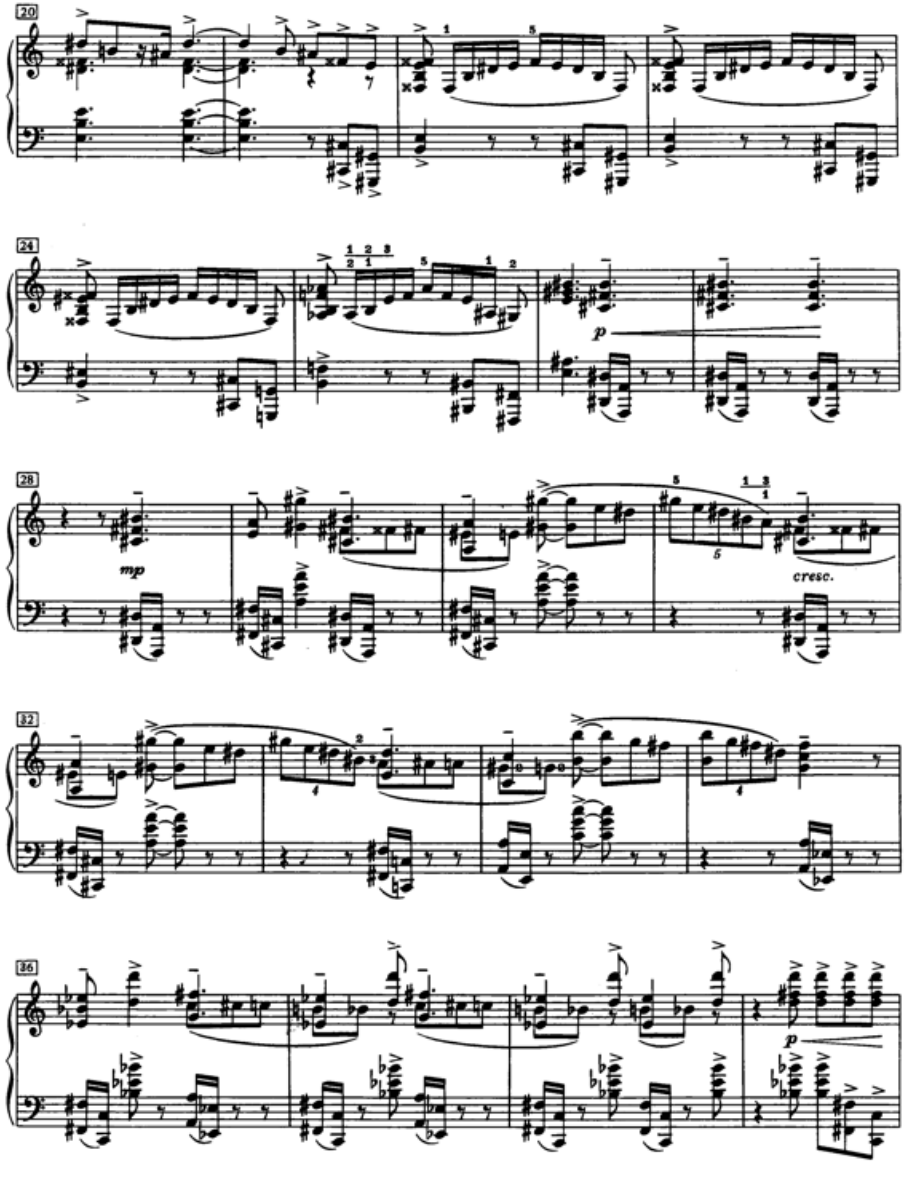
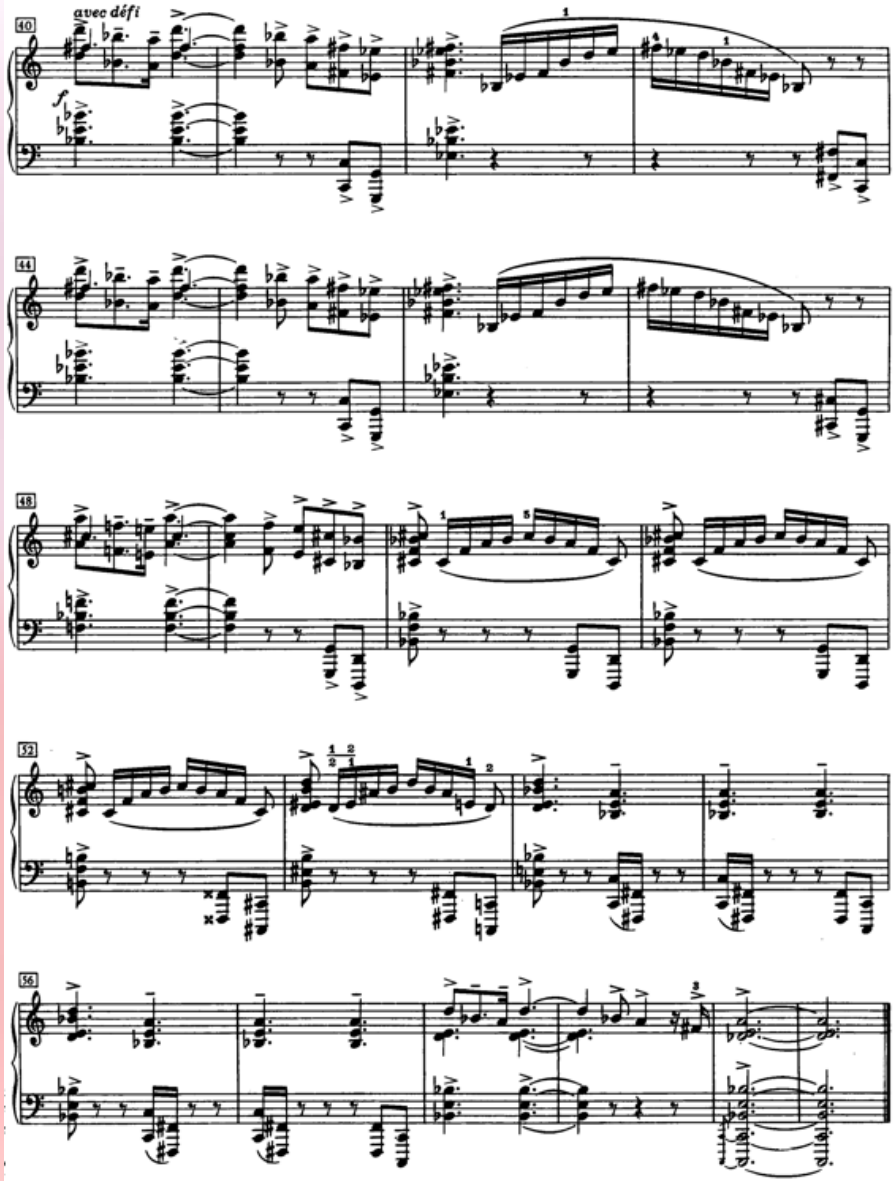
Prélude

Sauvage, belliqueux

Op. 59 Nr. 2



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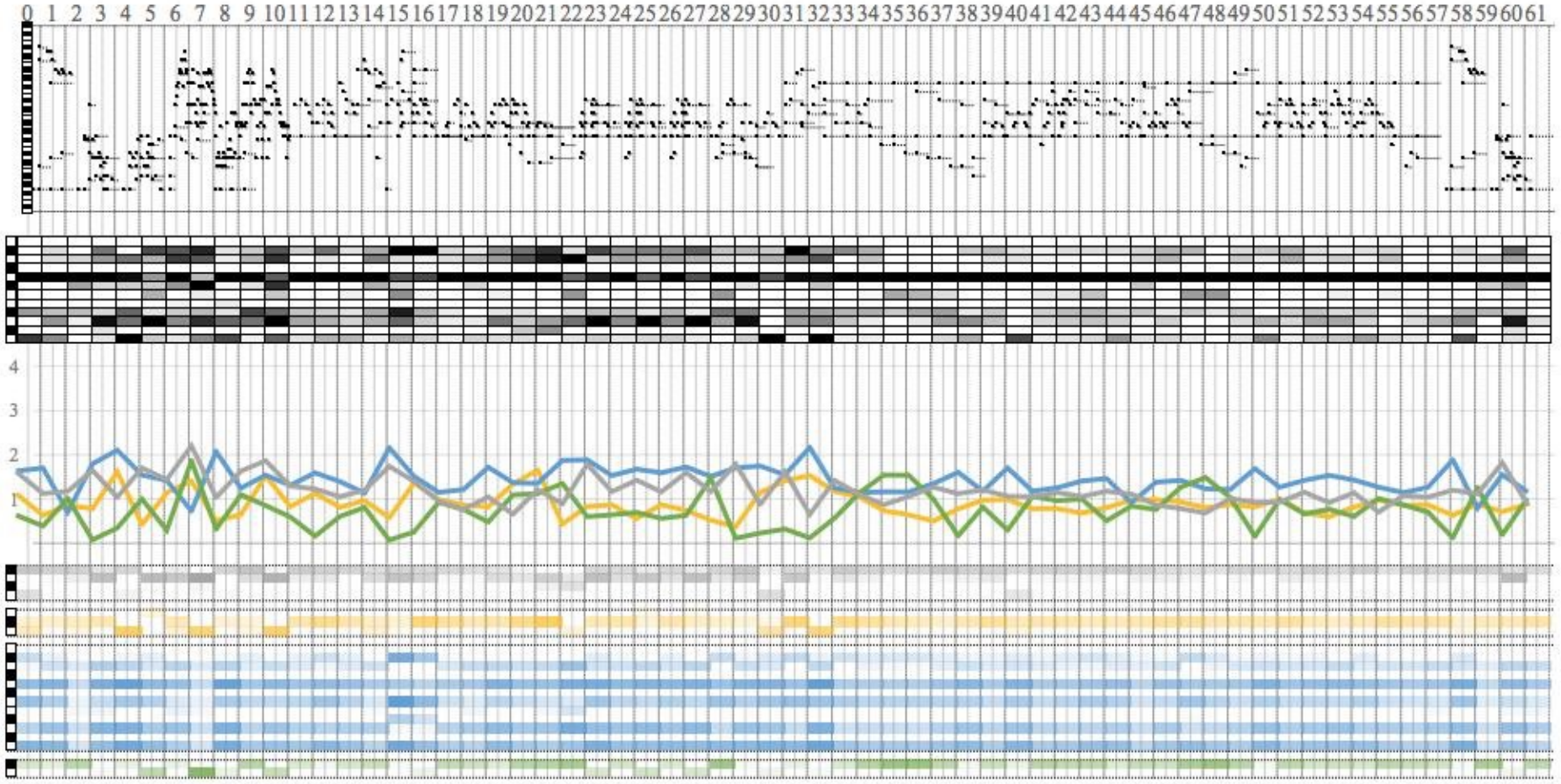
Op. 59/2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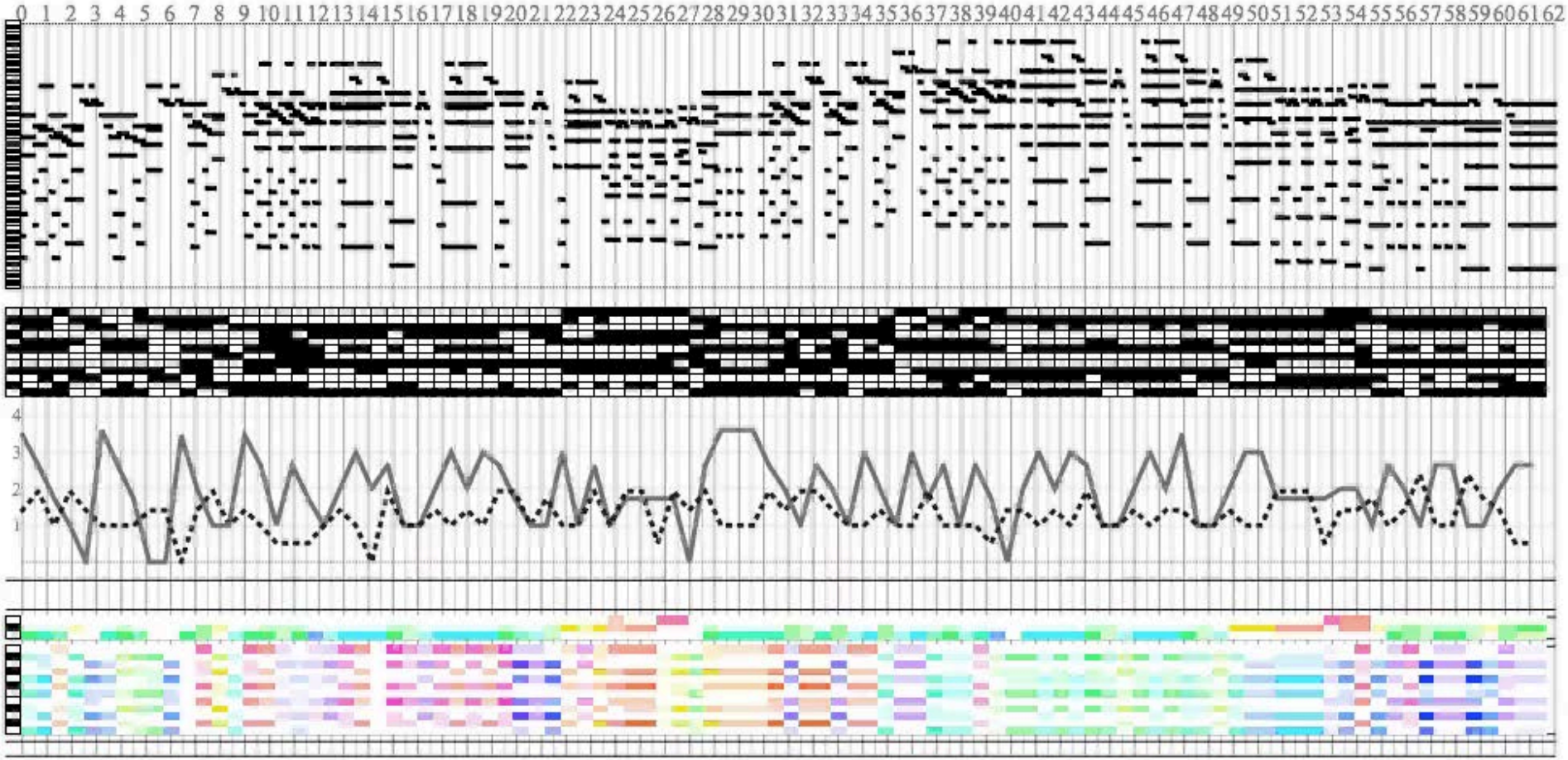
Op. 59/2


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62
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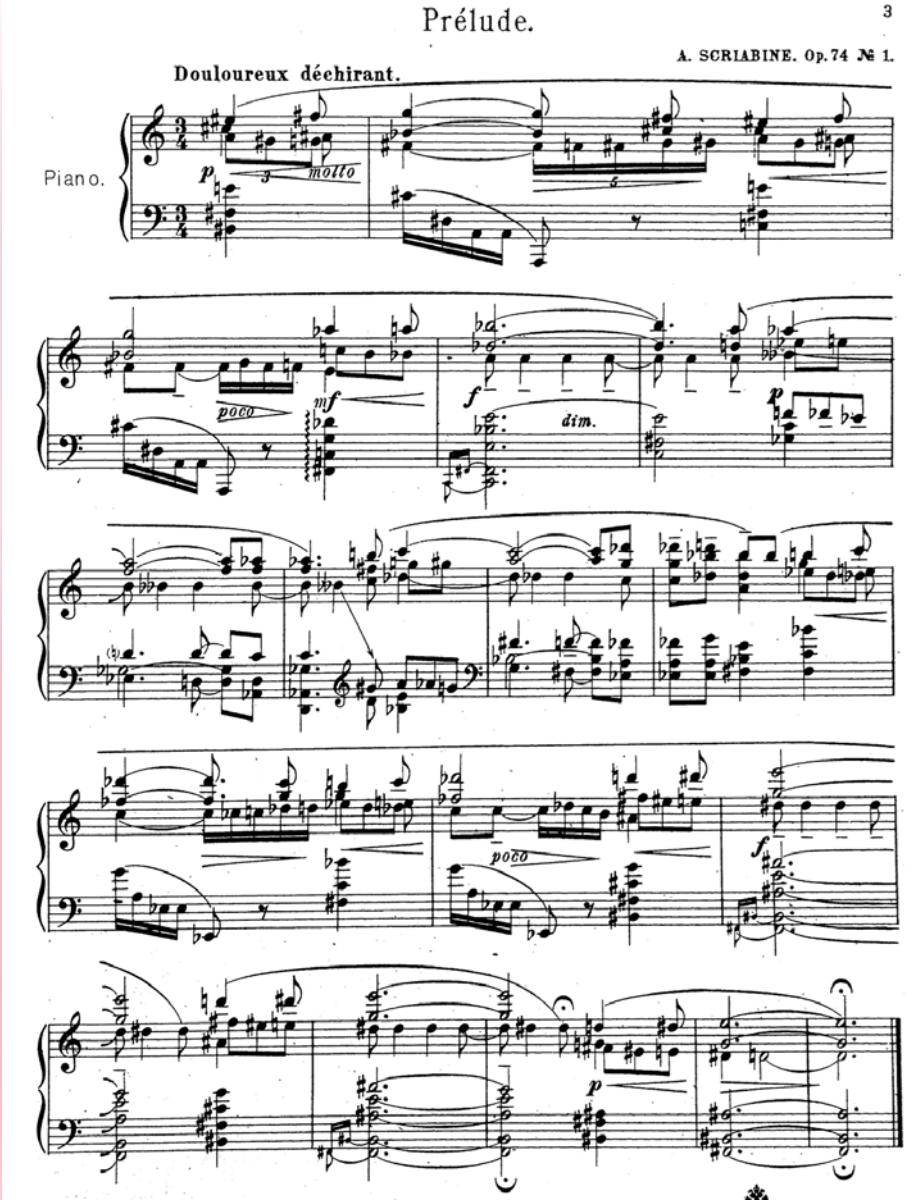
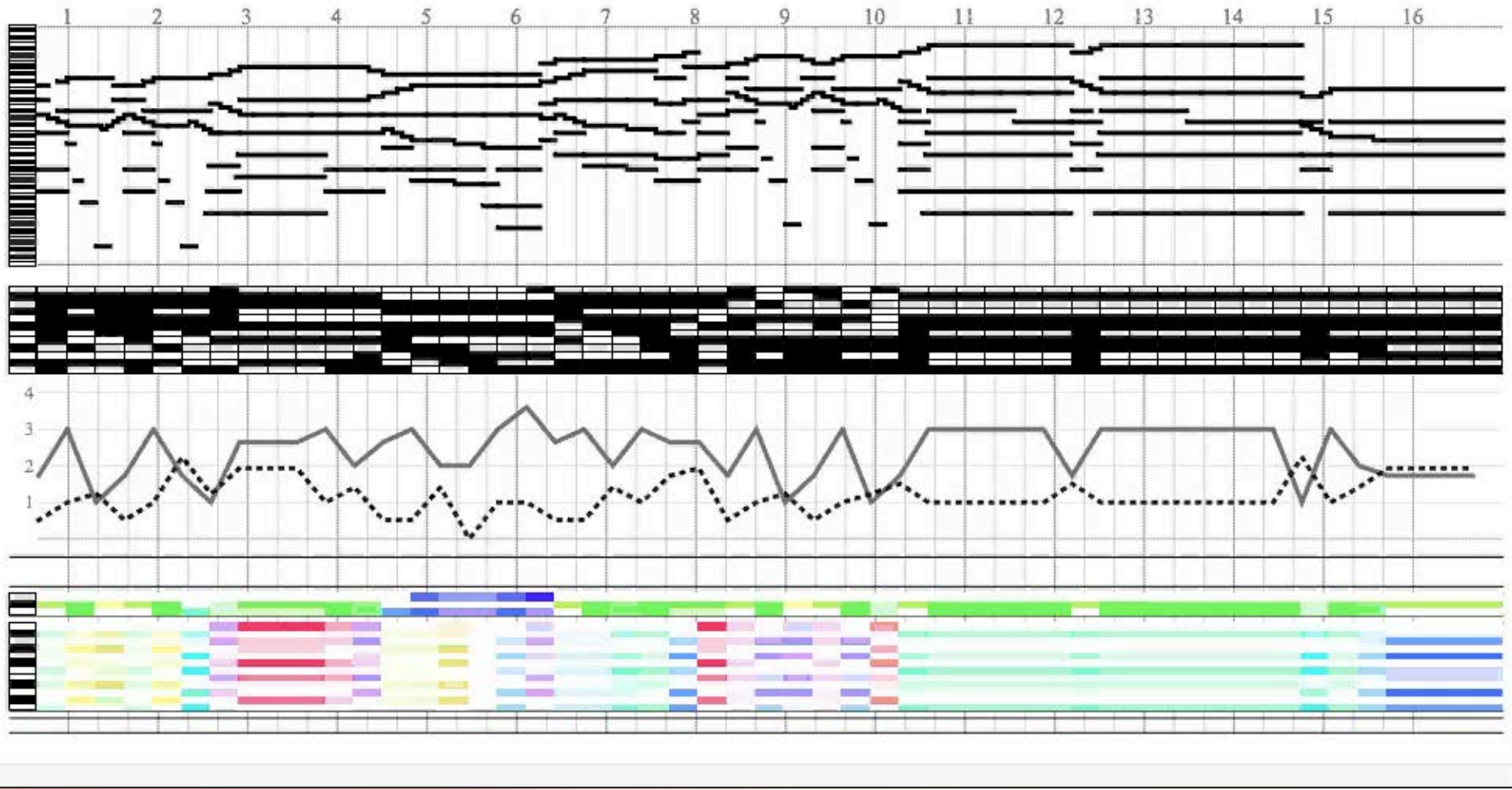
1


Prélude.
3
A. SCRIABINE. Op. 74 № 1.
Douloureux déchirant.
Piano.
molto
poco
mf
f
dim.
p
poco
f
p

Op. 74/1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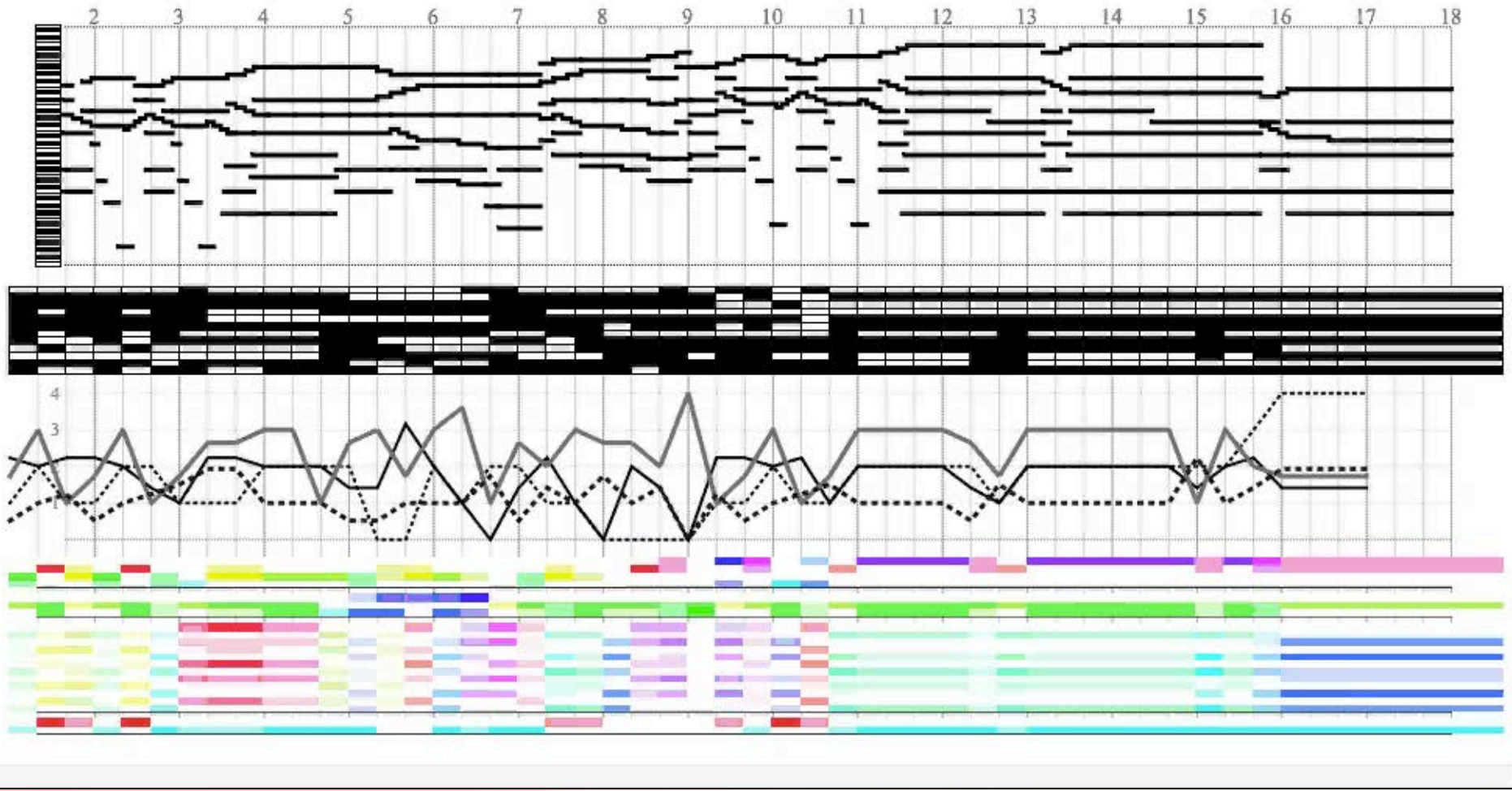
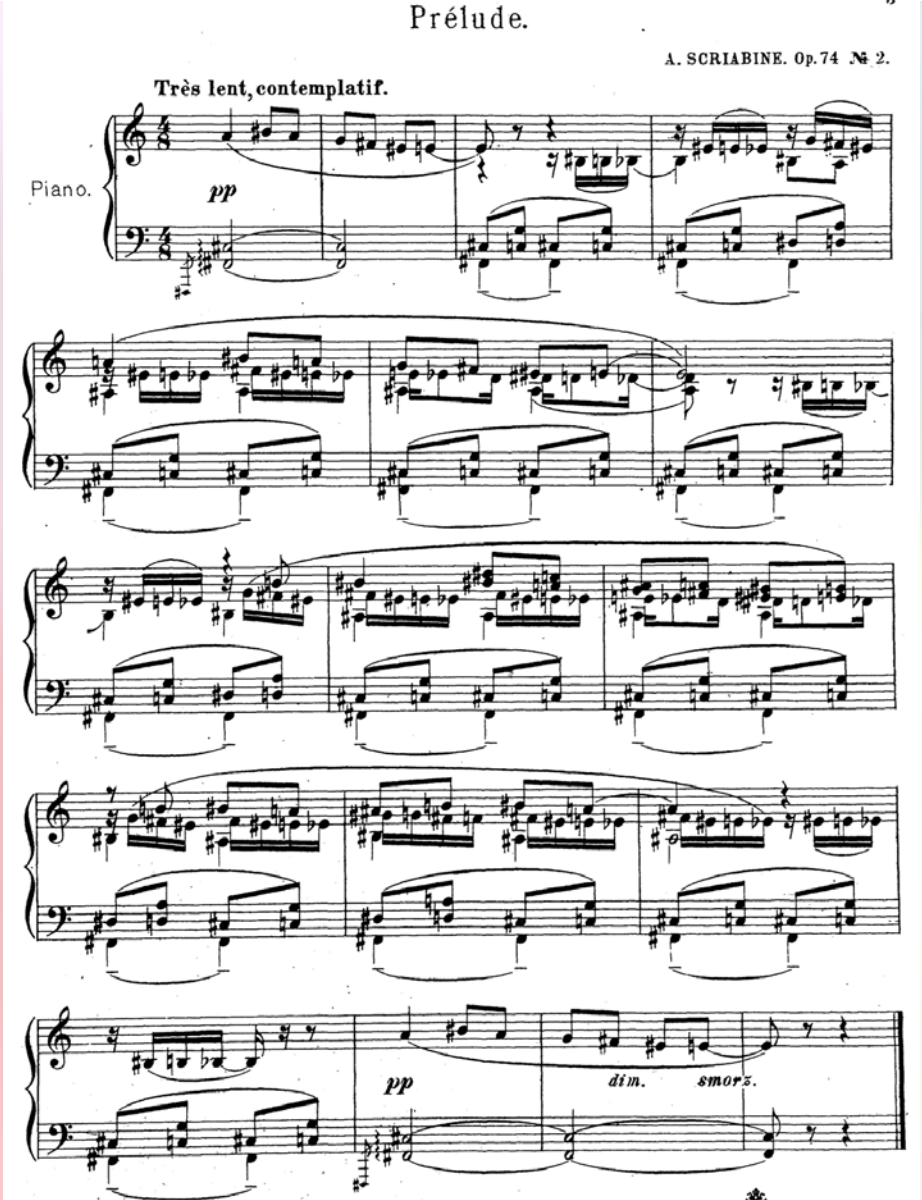
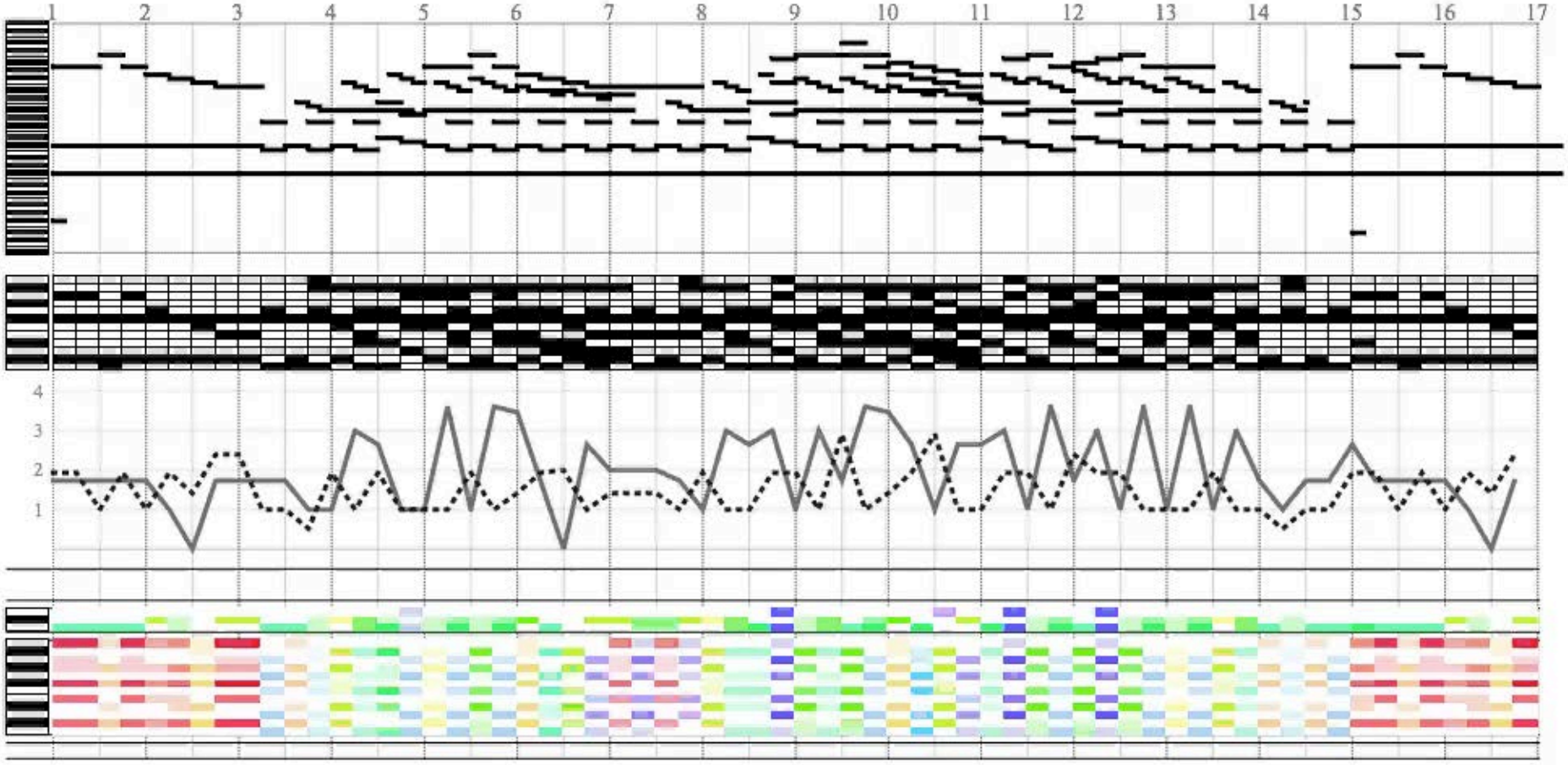
Op. 74/1



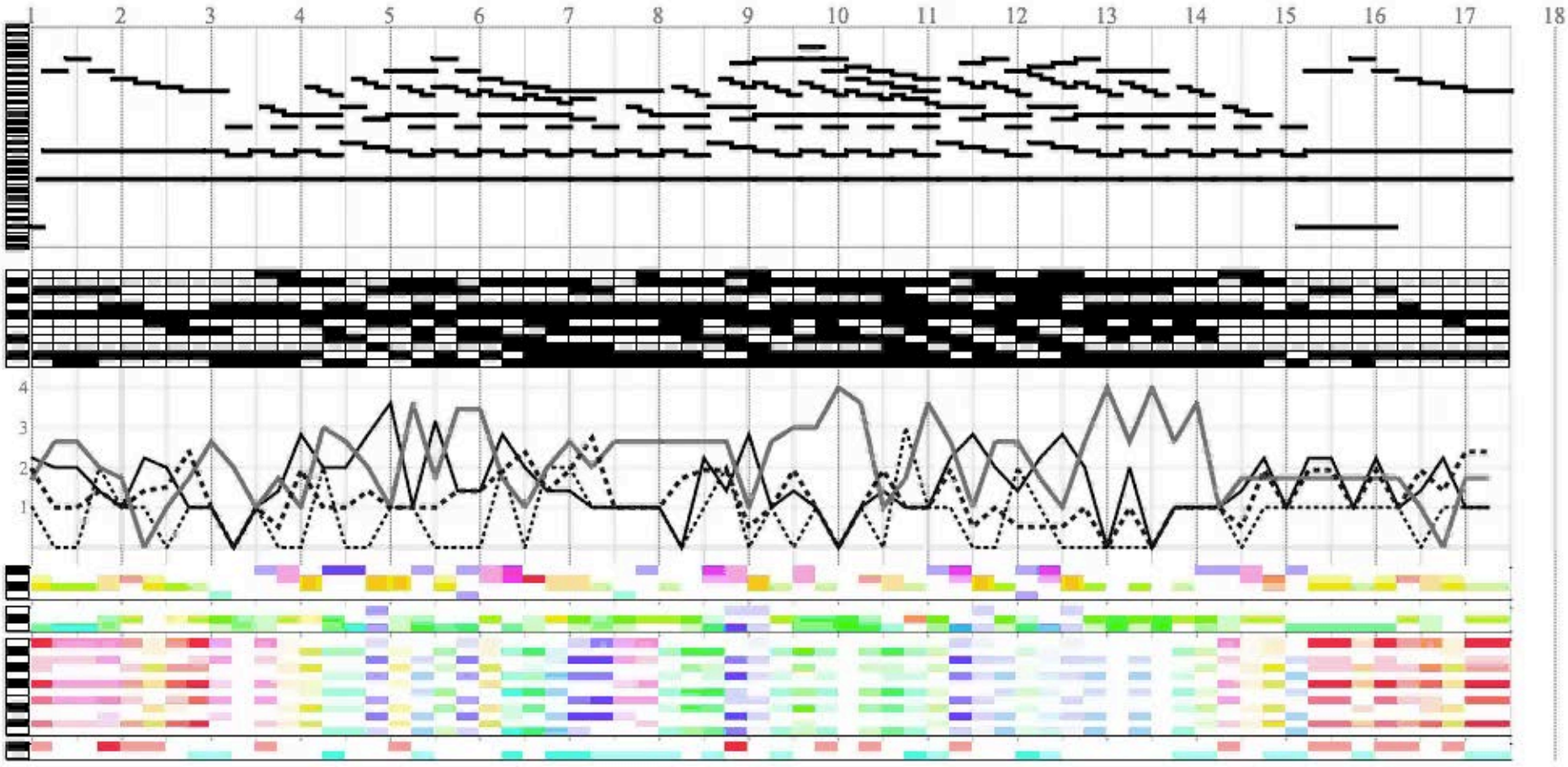
Op. 74/2


Prélude.
A. SCRIABINE. Op. 74 № 2.
Très lent, contemplatif.
Piano.
pp
pp
dim.
smorz.

Op. 74/2



Op. 74/2

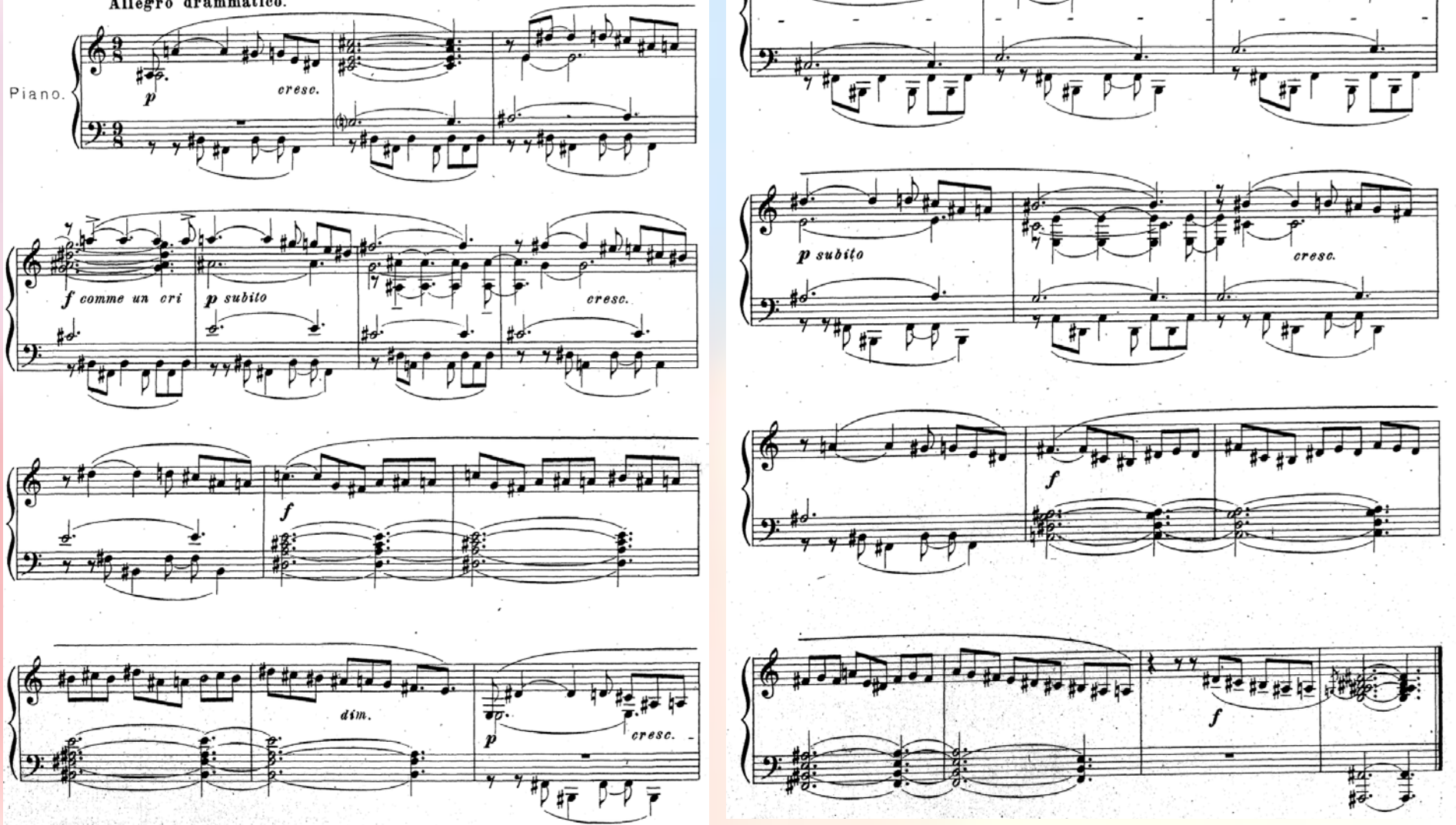


Op. 74/3

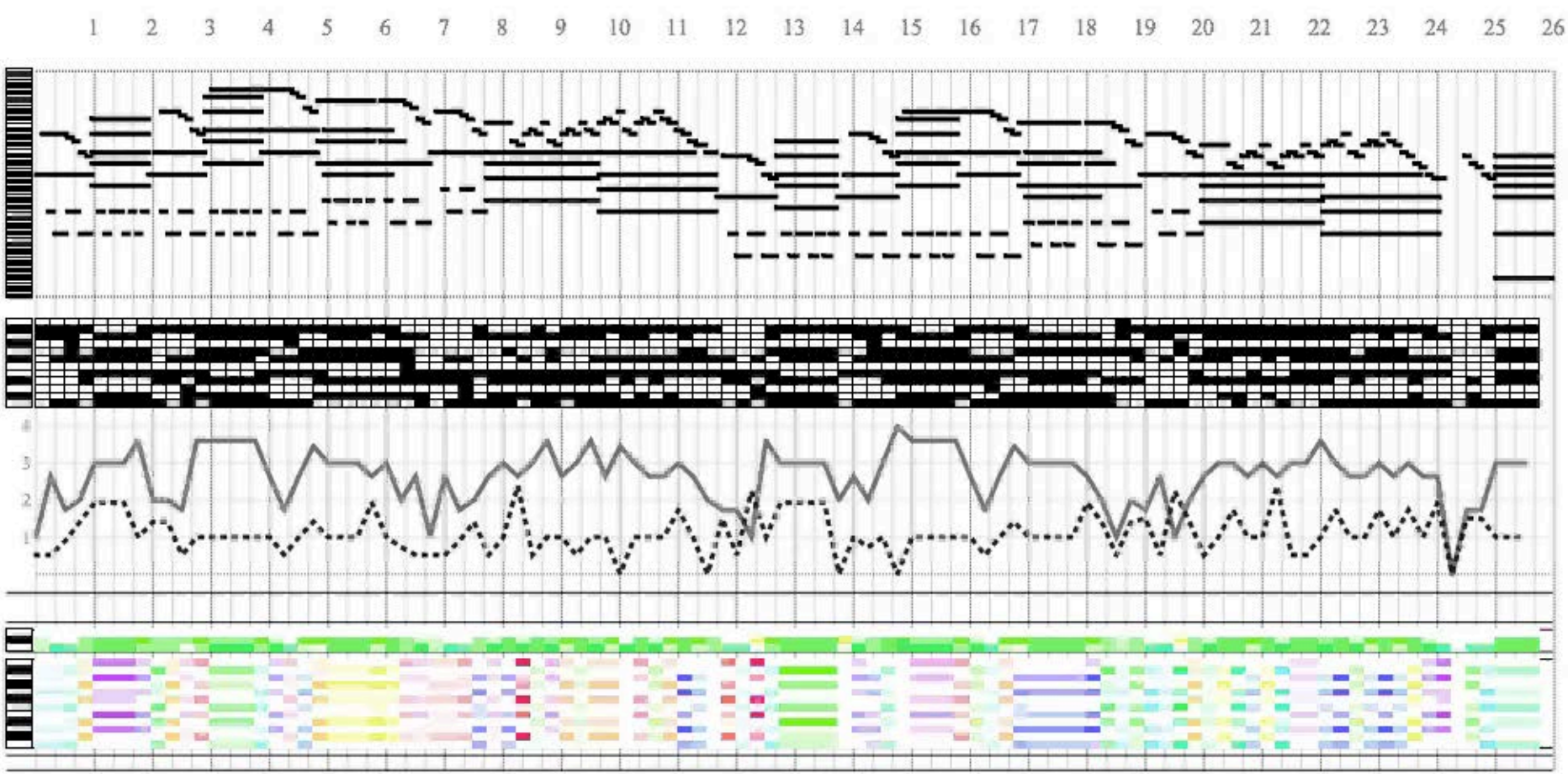
Prélude.

A. SCRIABINE. Op. 74 № 3.

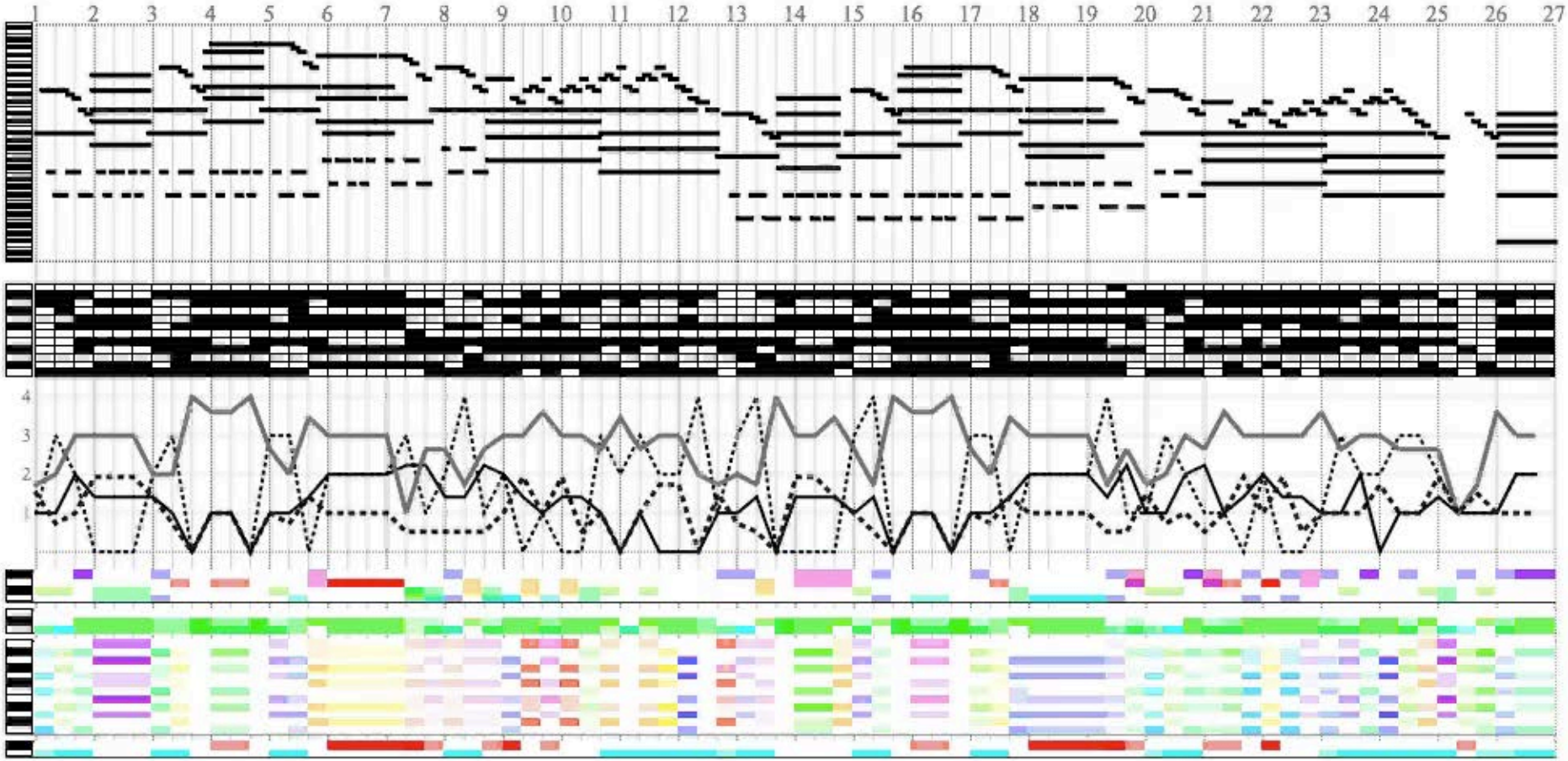
Allegro drammatico.



Op. 74/3



Op. 74/3

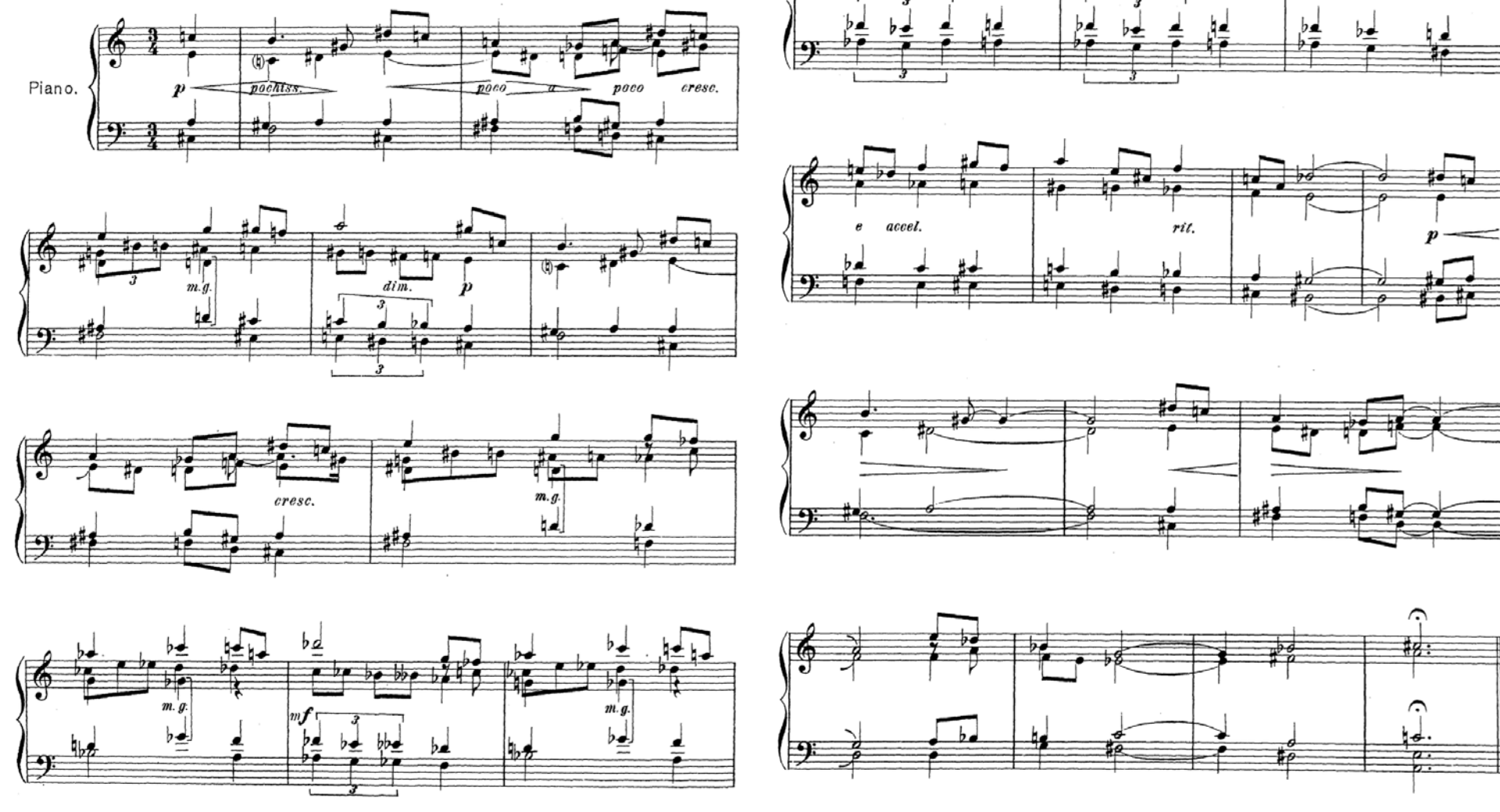


Op. 74/4

Prélude.

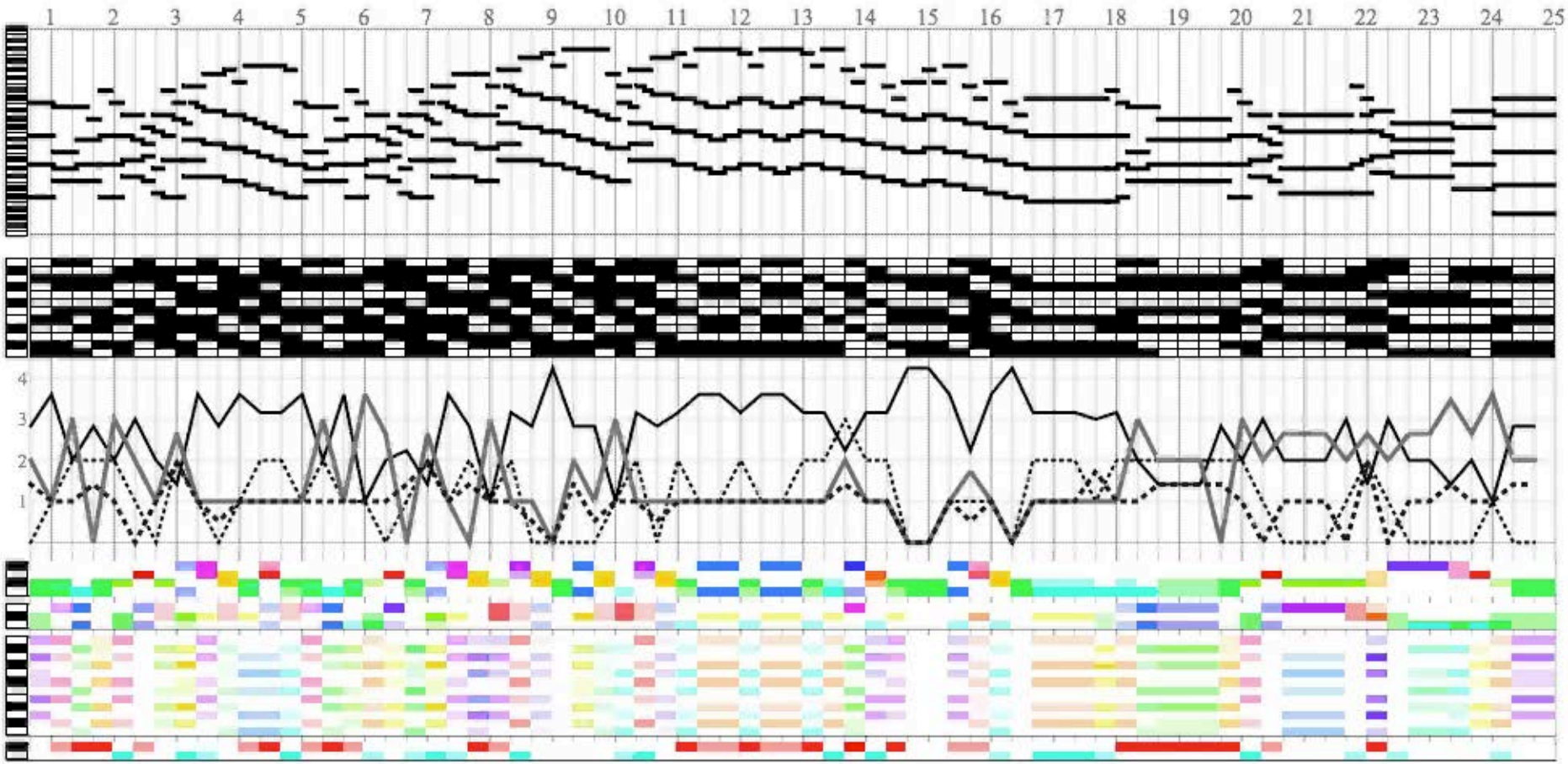
A. SCRIABINE. Op. 74 № 4.

Lent, vague, indécis.

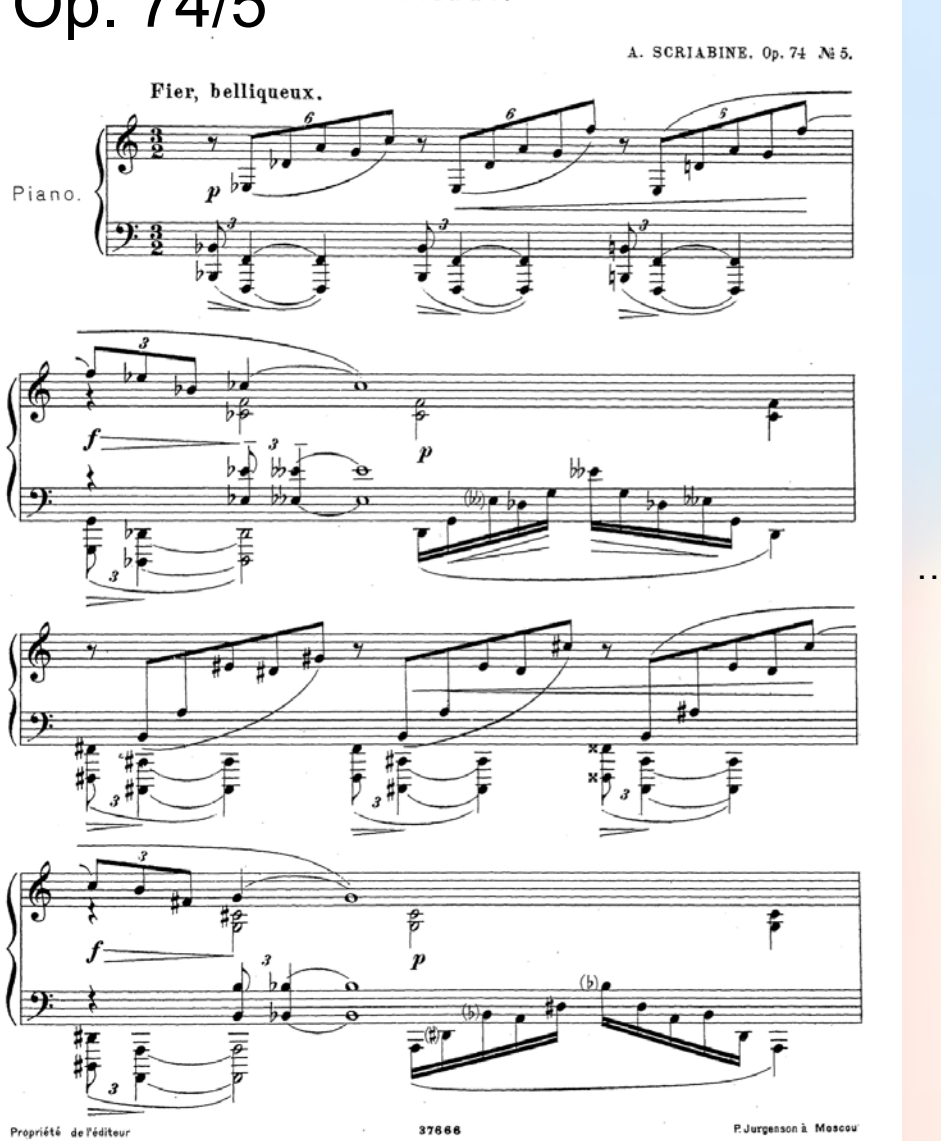


Op. 74/4

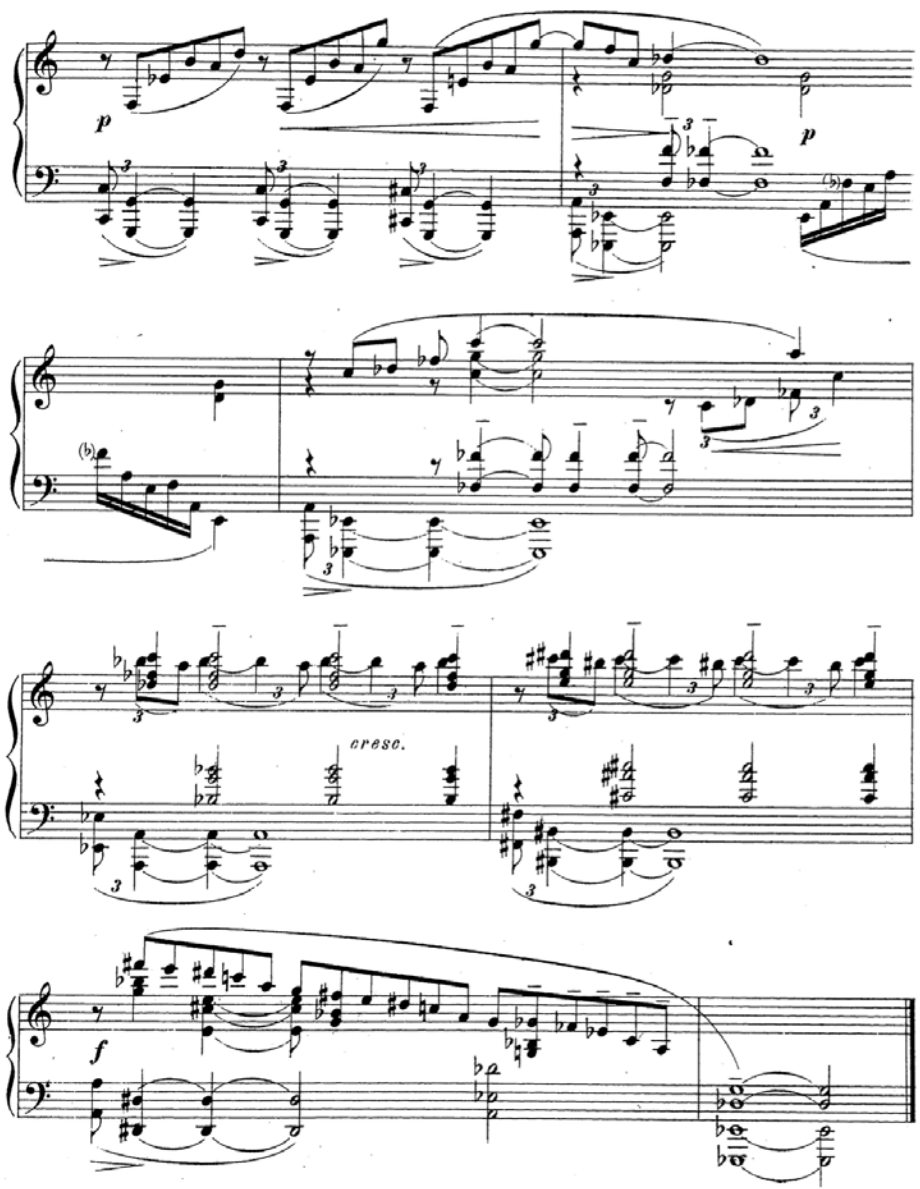
Hexatonic Tonality: high magnitude and moderate phase activity in the 3rd partial



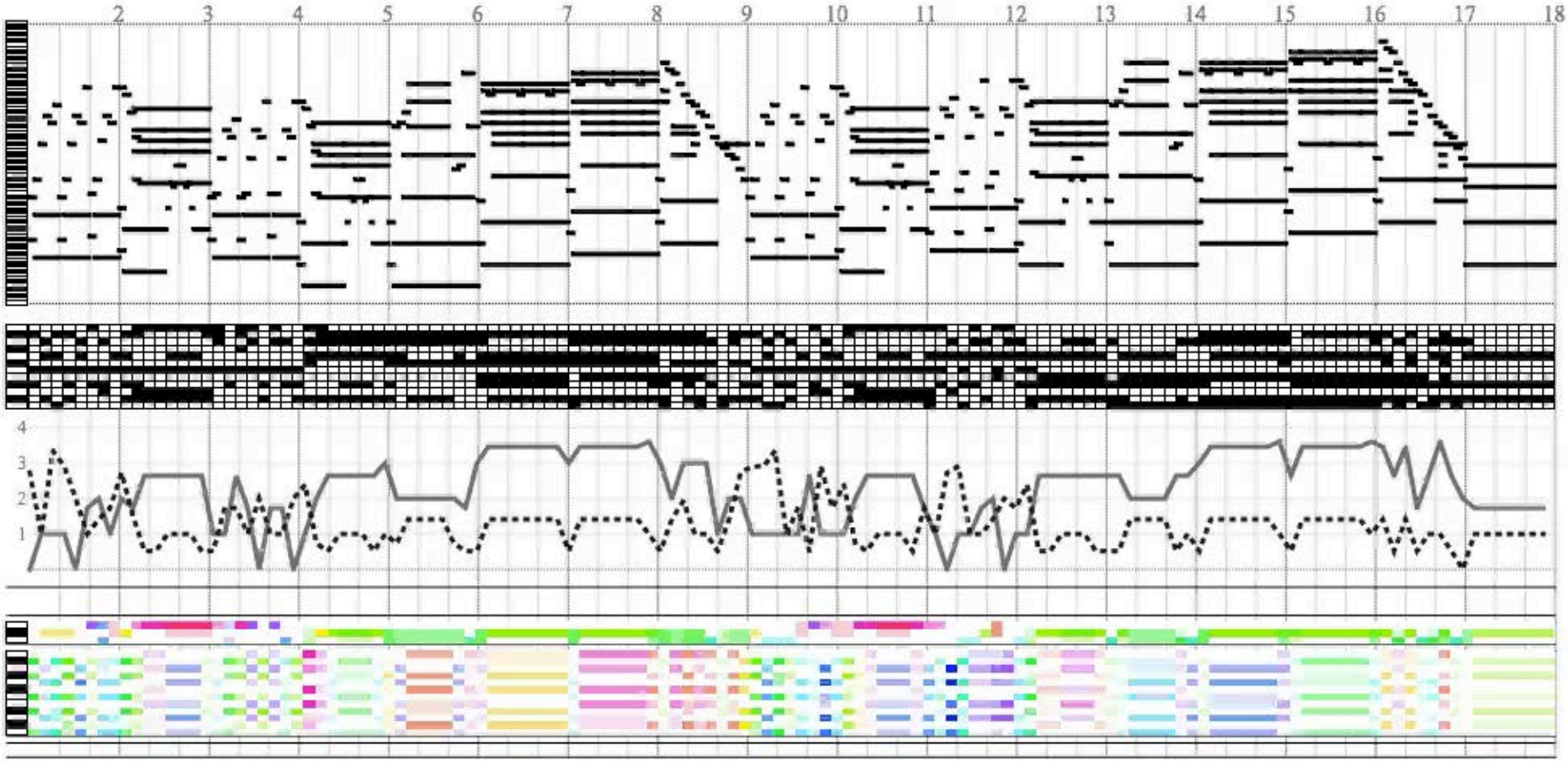
Op. 74/5

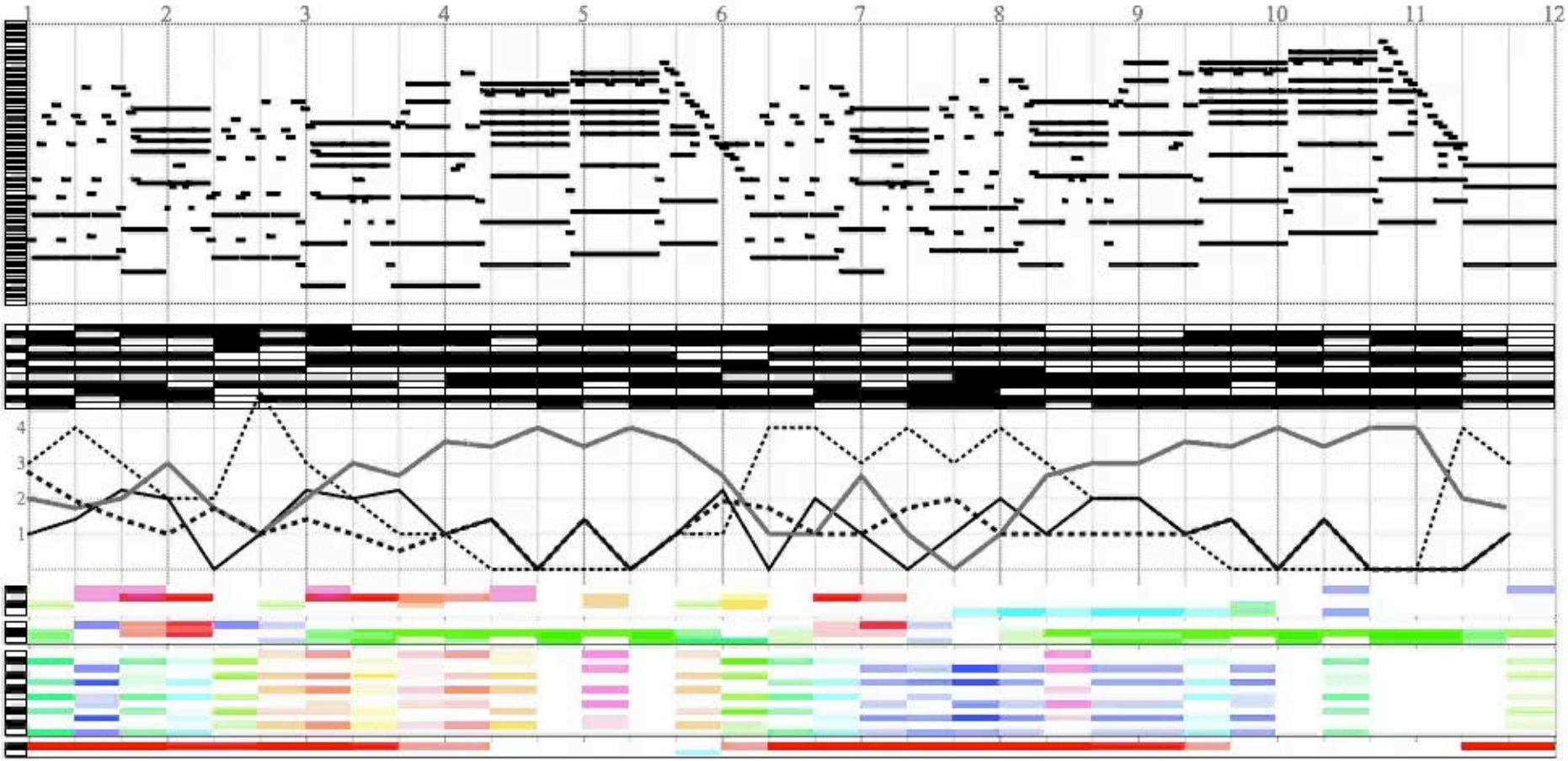

Prélude.
A. SCRIABINE. Op. 74 № 5.
Fier, belliqueux.
Piano.
Propriété de l'éditeur
37666
P. Jurgenson à Moscou

...


cresc.

Op. 74/5

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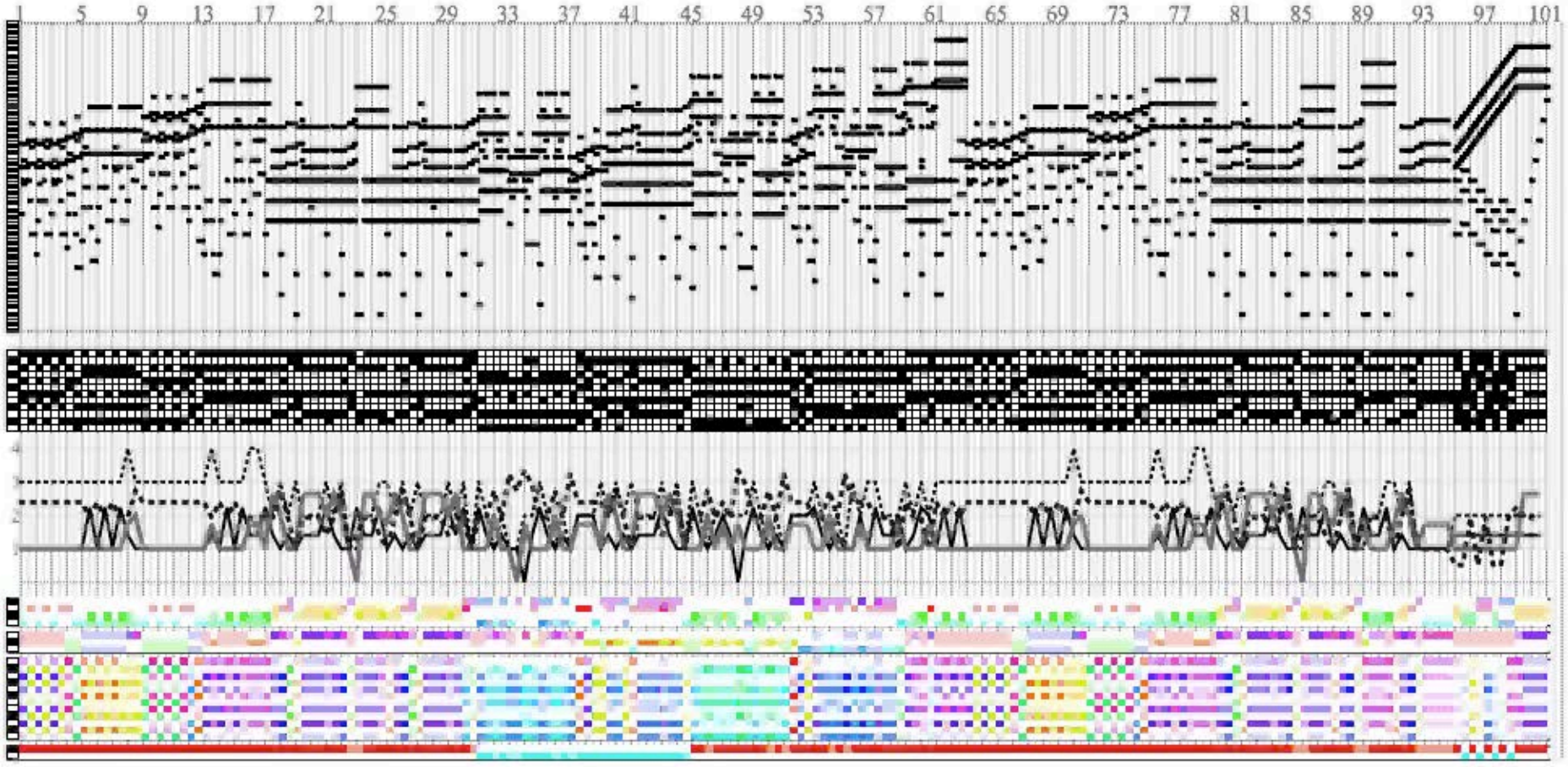
Op. 65/3

„Whole-Tone Tonality“