Andrián Pertout

# Sonus dulcis

for Clarinet and Pianoforte

No. 375g

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Composed in August, 2000 (Revised in January, 2003)

Arranged for Duo DICTO (Marco Antonio Mazzini – clarinet;
Ward de Vleeschhouwer – pianoforte)

In 2004, Sonus dulcis for String Orchestra was Joint-Winner of the Judges' Prize and Winner of the Audience Prize of the 2003 Oare String Orchestra Third International 'Music for Strings' Composing Competition (Faversham, UK)

World Premier: 6 November, 2005 (Centro Cultural de España, Tercer Festival Internacional de Música Clásica Contemporánea de Lima,
1-12 November, 2005, Lima, Perú) – Duo DICTO

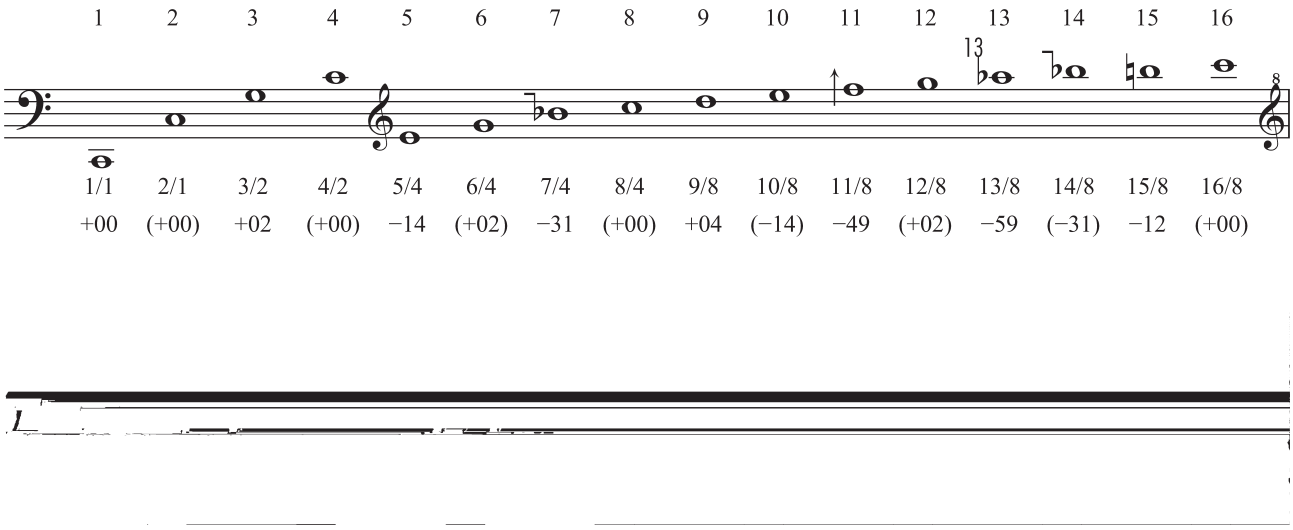
European Premier: 27 April, 2007 (Bösendorfersaal, 'Harmonia Classica 25th Anniversary' Concert, Vienna, Austria) – Duo DICTO

Duration: 5'49"

# PROGRAMME NOTES

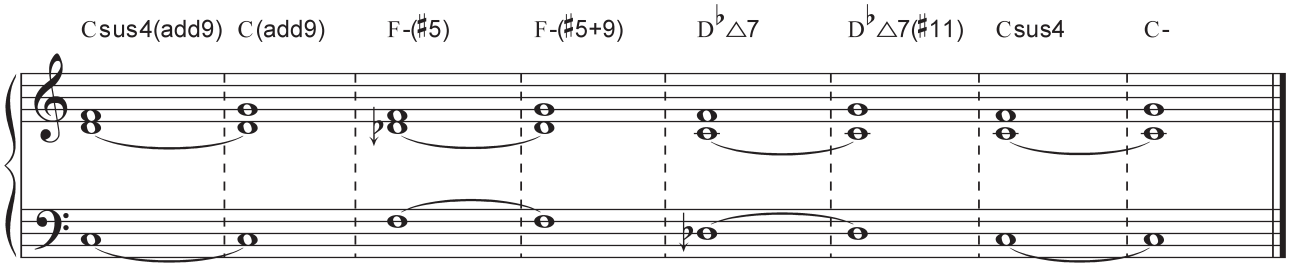
The overtones of a specific pitch are generally referred to as the 'harmonic series', and the musical scale derived from this series is constructed around pure (or just) intervals. This system of just intonation is strikingly dissimilar to the 'Twelve-Tone Equally-Tempered Division of the Octave,' which is based on the division of the octave into twelve equal intervals, technically referred to as tempered half-tones; the frequency ratio of each semitone therefore mathematically representing the twelfth root of two, or in different terms, the distance between any two tones representing twelve times the logarithm on the base of two of the frequency ratio. The ratio of the equally tempered semitone is expressed in mathematical terms as $1:\sqrt[12]{2}=1:1.059463094$, or approximately 89/84. In 'Lou Harrison: Composing a World' Leta E. Miller and Fredric Lieberman describe just intonation thus: "Pure intervals arise when the frequencies of the individual tones reflect the precise mathematical proportions that occur in the series: 3/2 for the fifth, 4/3 for the fourth, etc." Intervals manifested naturally within the harmonic series are particularly favourable in just intonation, and certainly ones with "superparticular vibration ratios", where the "numerator exceeds the denominator by one" such as the just perfect fifth (3/2), just perfect fourth (4/3), just major third (5/4) and just minor third (6/5). German physicist Herman Ludwig Helmholtz was its passionate advocate, and his research suggests that in actual performance string players have a natural tendency towards just intervals, and especially in the absence of fixed pitch keyboard instruments.

**The Fundamental C and its Harmonics (Overtones) – First Partial, through the 32nd Partial**




'Sonus Dulcis' or 'Euphony' – the Latin expression characterizing a sound, noise, voice, or tone that is sweet, pleasant, delightful, charming, or dear – was conceived in August of 2000 originally as a work for string trio, serving as an exploration of the system of just intonation, or pure intervals, and therefore attempting to avoid sequential intervals with non-superparticular vibration ratios such as the Pythagorean limma (256/243, or 90.225 cents), acute or large tone (256/225, or 223.463 cents), augmented second (75/64, or 274.582 cents), Pythagorean minor third, or trihemitone (32/27, or 294.135 cents), Pythagorean major third, or ditone (81/64, or 407.820 cents), acute or large major third (32/25, or 427.373 cents), grave or small fourth

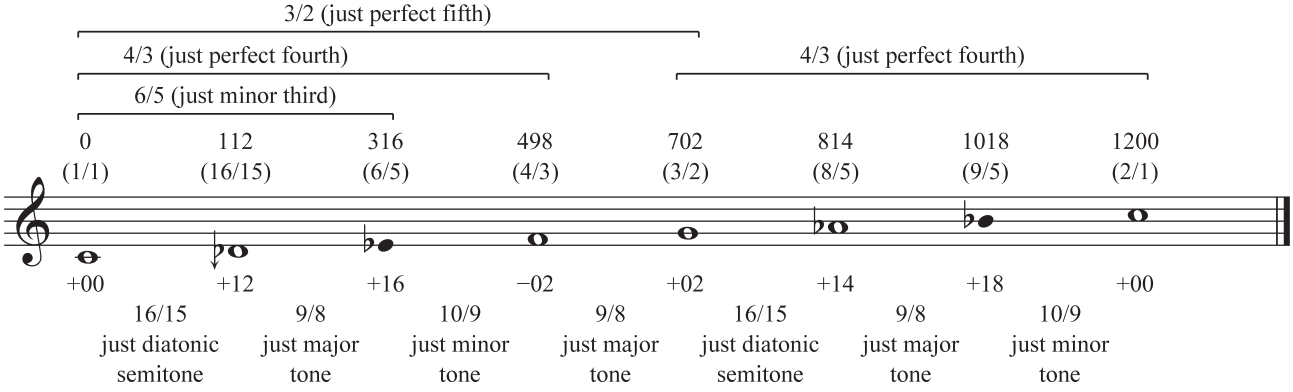
(320/243, or 476.539 cents), acute or large fourth (27/20, or 519.551 cents), grave or small augmented fourth (25/18, or 568.717 cents), just tritone, or augmented fourth (45/32, or 590.224 cents), cyclic tritone, or augmented fourth (64/45, or 609.776 cents), acute diminished fifth (36/25, or 631.283 cents), grave or small fifth (40/27, or 680.449 cents), acute or large fifth (243/160, or 723.014 cents), augmented fifth (25/16, or 772.627 cents), Pythagorean minor sixth (128/81, or 792.180 cents), just minor sixth (8/5, or 813.686 cents), just major sixth (5/3, or 884.359 cents), Pythagorean major sixth (27/16, or 905.865 cents), acute or large major sixth (128/75, or 925.418 cents), grave or small minor seventh (225/128, or 976.537 cents), Pythagorean minor seventh (16/9, or 996.090 cents), acute or large minor seventh (9/5, or 1017.596 cents), just diatonic major seventh (15/8, or 1088.269 cents), Pythagorean major seventh (243/128, or 1109.775 cents), and acute or large major seventh (48/25, or 1129.328 cents); in favour of melodic structures utilizing the grave or small just chromatic semitone, or minor half-tone (25/24, or 70.672 cents), just diatonic semitone, or major half-tone (16/15, or 111.731 cents), just minor tone (10/9, or 182.404 cents), just major tone (9/8, or 203.910 cents), just minor third (6/5, or 315.641 cents), just major third (5/4, or 386.314 cents), just perfect fourth (4/3, or 498.045 cents), and just perfect fifth (3/2, or 701.955 cents). In striking contrast, vertical sonority is given more freedom, with the limited inclusion of the dissonant *Pythagorean minor third, or trihemitone (flat just minor third) within the harmonic scheme, in the interest of tension and release.




**32/27 between D and F in the treble*

## The Harmonic Characteristics of the 'In' Scale

The Japanese 'In' scale is generally associated with art, koto and shamisen music, and is essentially a hemitonic pentatonic scale incorporating two auxiliary tones, E♭ and B♭. It features the just diatonic semitone, or major half-tone (16/15, or 111.731 cents), just minor tone (10/9, or 182.404 cents), and just major tone (9/8, or 203.910 cents) intervals.



## The Harmonic Division of the Octave

The Harmonic Division of the Octave is based on the harmonic series. It is a scale of 'Just Intonation,' where the intervals are called pure (or just), because there are no beats between the notes or their harmonics.

Relative Pitch: A4 = 440Hz/C4 (Middle C) = 261.6255654Hz

| DEGREE NUMBER | NOTE | INTERVAL | RATIO (FRACTION) | FREQUENCY (HERTZ) | CENTS | TUNING |
|---|---|---|---|---|---|---|
| 01 | C | unison | 1/1 | 261.626 | 0.000 | +00 |
| 02 | D𝄬 | just diatonic semitone, or major half-tone | 16/15 | 279.067 | 111.731 | +12 |
| 03 | D𝄭 | just minor tone | 10/9 | 290.695 | 182.404 | −18 |
| 04 | D | just major tone (9th harmonic) | 9/8 | 294.329 | 203.910 | +04 |
| 05 | E♭ | just minor third | 6/5 | 313.951 | 315.641 | +16 |
| 06 | E | just major third (5th harmonic) | 5/4 | 327.032 | 386.314 | −14 |
| 07 | F | just and Pythagorean perfect fourth | 4/3 | 348.834 | 498.045 | −02 |
| 08 | F𝄲 | just tritone, or augmented fourth (45th harmonic) | 45/32 | 367.911 | 590.224 | −10 |
| 09 | F𝄳 | cyclic tritone, or augmented fourth | 64/45 | 372.090 | 609.776 | +10 |
| 10 | G | just and Pythagorean perfect fifth (3rd harmonic) | 3/2 | 392.438 | 701.955 | +02 |
| 11 | A♭ | just minor sixth | 8/5 | 418.601 | 813.686 | +14 |
| 12 | A | just major sixth | 5/3 | 436.043 | 884.359 | −16 |
| 13 | B𝄭𝄬 | septimal or subminor seventh (7th harmonic) | 7/4 | 457.845 | 968.826 | −31 |
| 14 | B𝄬 | Pythagorean minor seventh | 16/9 | 465.112 | 996.090 | −04 |
| 15 | B♭ | acute or large minor seventh | 9/5 | 470.926 | 1017.596 | +8 |
| 16 | B | just diatonic major seventh (15th harmonic) | 15/8 | 490.548 | 1088.269 | −12 |
| 01 | C | octave | 2/1 | 523.251 | 1200.000 | +00 |

## The Harmonic Series

The overtones of a specific pitch are generally referred to as the harmonic series. The following table presents the fundamental C and its harmonics (overtones) from the first partial, through the 32nd partial.

Relative Pitch: A4 = 440Hz/C4 (Middle C) = 261.6255654Hz

| DEGREE NUMBER | NOTE | INTERVAL | RATIO (FRACTION) | FREQUENCY (HERTZ) | CENTS | TUNING |
|---|---|---|---|---|---|---|
| 01 | C | unison<br>(1) | 1/1 | 261.626 | 0.000 | +00 |
| 02 | C17♯ | (17th harmonic)<br>(17) | 17/16 | 277.977 | 104.955 | +05 |
| 03 | D | just major tone<br>(9th harmonic)<br>(9, 18) | 9/8 | 294.329 | 203.910 | +04 |
| 04 | E19♭ | overtone minor third<br>(19th harmonic)<br>(19) | 19/16 | 310.680 | 297.513 | −02 |
| 05 | E | just major third<br>(5th harmonic)<br>(5, 10, 20) | 5/4 | 327.032 | 386.314 | −14 |
| 06 | F7+ | septimal or subfourth<br>(21st harmonic)<br>(21) | 21/16 | 343.384 | 470.781 | −29 |
| 07 | F↑ | neutral tritone<br>(11th harmonic)<br>(11, 22) | 11/8 | 359.735 | 551.318 | −49 |
| 08 | F23♯+ | (23rd harmonic)<br>(23) | 23/16 | 376.087 | 628.274 | +28 |
| 09 | G | just and Pythagorean<br>perfect fifth (3rd harmonic)<br>(3, 6, 12, 24) | 3/2 | 392.438 | 701.955 | +02 |
| 10 | G♯ | augmented fifth<br>(25th harmonic)<br>(25) | 25/16 | 408.790 | 772.627 | −27 |
| 11 | A13♭ | overtone sixth<br>(13th harmonic)<br>(13, 26) | 13/8 | 425.142 | 840.528 | −59 |
| 12 | A+ | Pythagorean major sixth<br>(27th harmonic)<br>(27) | 27/16 | 441.493 | 905.865 | +06 |
| 13 | B♭ | septimal or subminor<br>seventh (7th harmonic)<br>(7, 14, 28) | 7/4 | 457.845 | 968.826 | −31 |
| 14 | B29♭ | (29th harmonic)<br>(29) | 29/16 | 474.196 | 1029.577 | +30 |
| 15 | B | just diatonic major<br>seventh (15th harmonic)<br>(15, 30) | 15/8 | 490.548 | 1088.269 | −12 |
| 16 | B31 | major seventh<br>(31) | 31/16 | 506.900 | 1145.036 | +45 |
| 01 | C | octave<br>(2, 4, 8, 16, 32) | 2/1 | 523.25 | 1200 | +00 |

# INSTRUMENTATION

## PLAYERS

B♭ Clarinet

Pianoforte

Transposed score

# PERFORMANCE NOTES

In this score, accidentals apply throughout the bar.

All instruments, with the following exceptions, sound as written in the score: the B♭ clarinet sounds a major second lower than written.

All intervals (in the original String Trio arrangement) correspond to the 'In' scale outlined in the programme notes, except for D♮ (measure 1, 5), which relative to the tonic should sound as a major tone (9/8, or 203.910 cents). This in effect generates a Pythagorean minor third, or trihemitone (32/27, or 294.135 cents) between the viola and the violin, and constitutes the only deliberate use of dissonant intervals in the piece.

The minor seventh required from the performers is a five-limit 9/5 ratio (the acute or large minor seventh, equal to 1017.596 cents) as opposed to the alternatives offered by three-limit and seven-limit systems of just intonation (the septimal or subminor seventh and Pythagorean minor seventh, equal to 7/4 and 16/9, or 968.826 and 996.090 cents).

### Clarinet

| | |
|---|---|
| *dull, breathy tone* | play with a dull, breathy tone, imitating 'sul tasto' string bowing technique |
| *sing and play* | the performer should sing the notated pitch while playing with enough force to produce distortion |

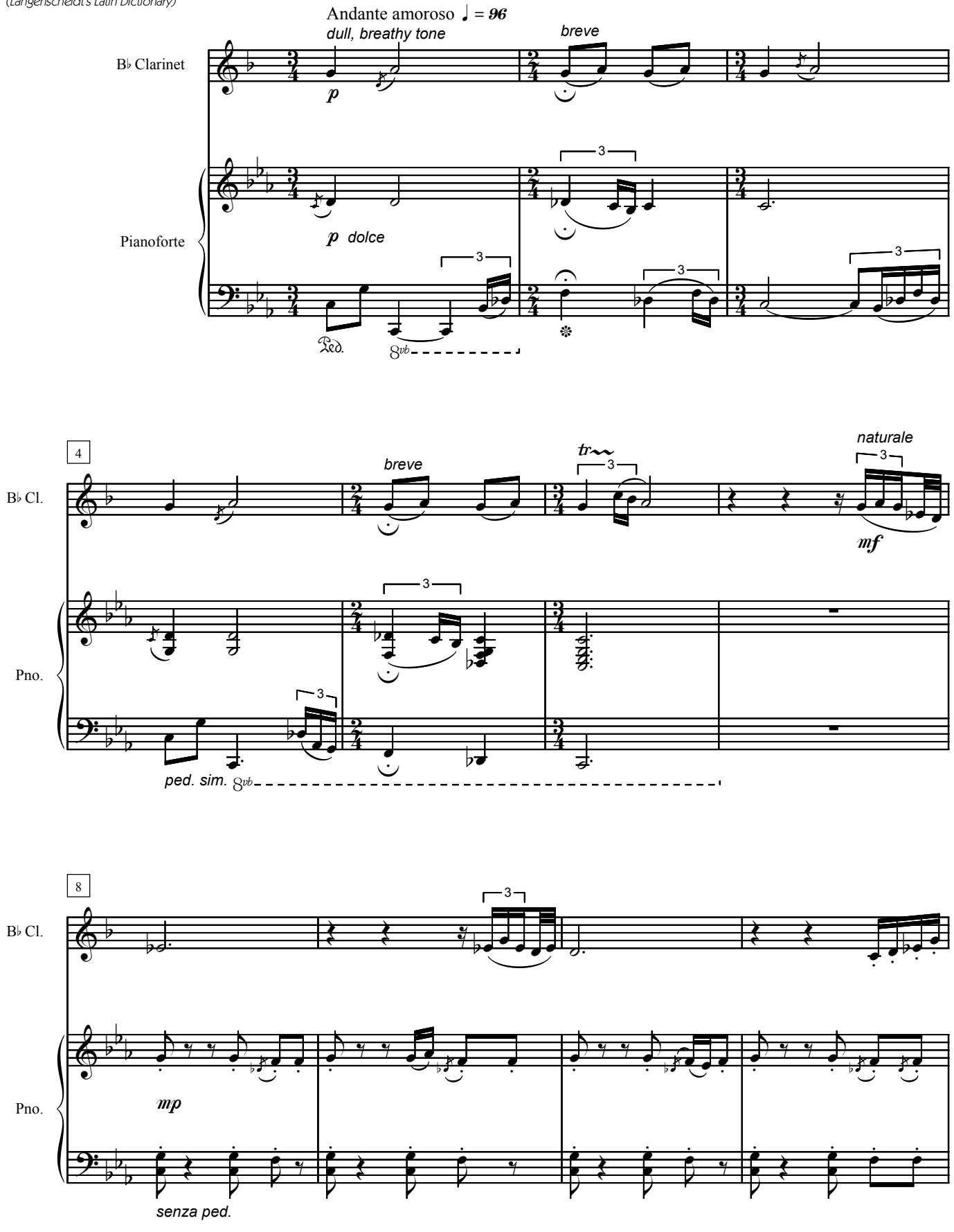
*Arranged for Duo DICTO*

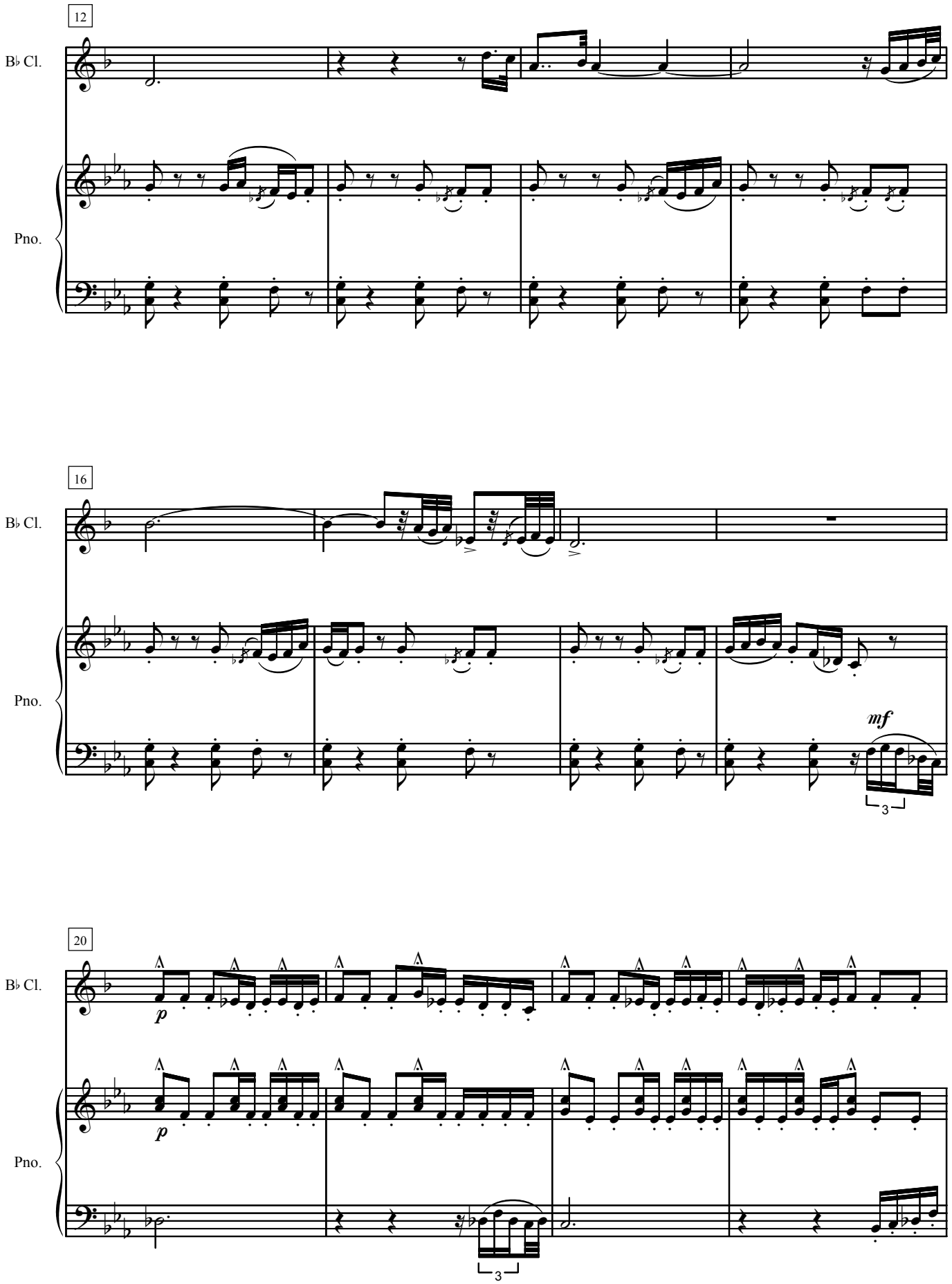
# Sonus dulcis

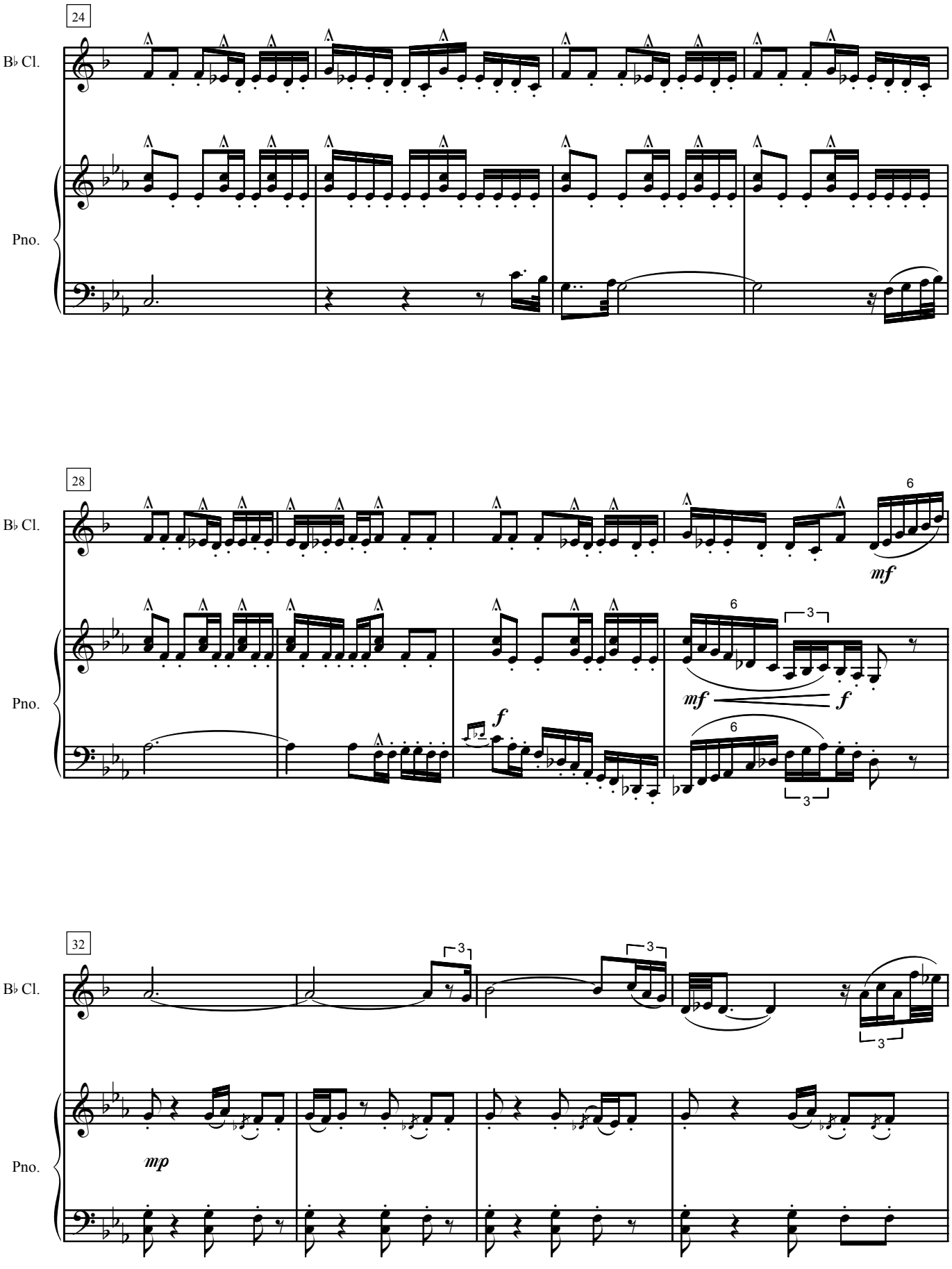
for Clarinet and Pianoforte

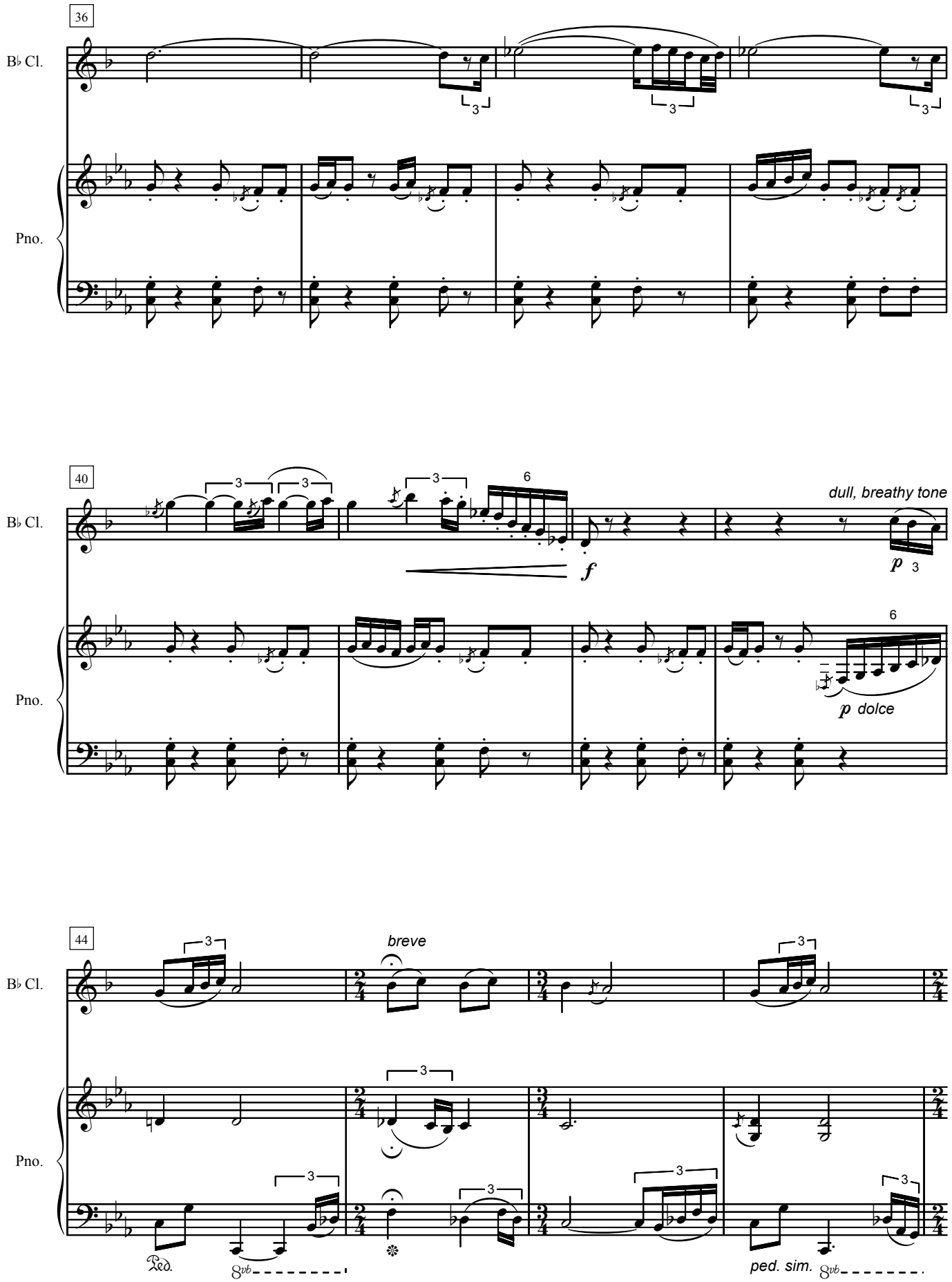
**euphony**, *sonus dulcis*
**sonus**, ī *m* sound, noise; voice; tone
**dulcis**, *e* sweet; pleasant, delightful, charming, dear
*(Langenscheidt's Latin Dictionary)*

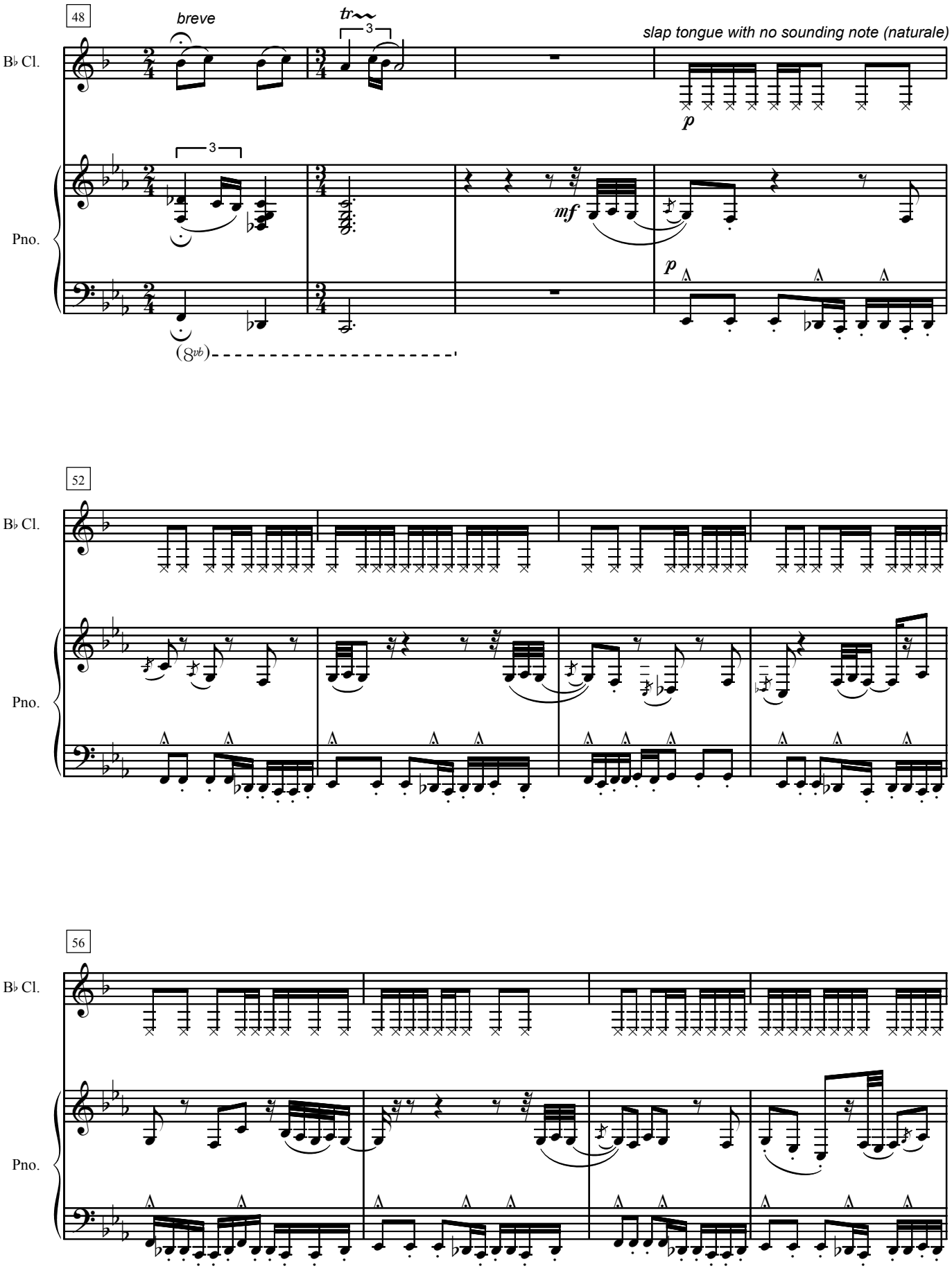
Andrián Pertout, No. 375g
2000 (Rev. 2003)

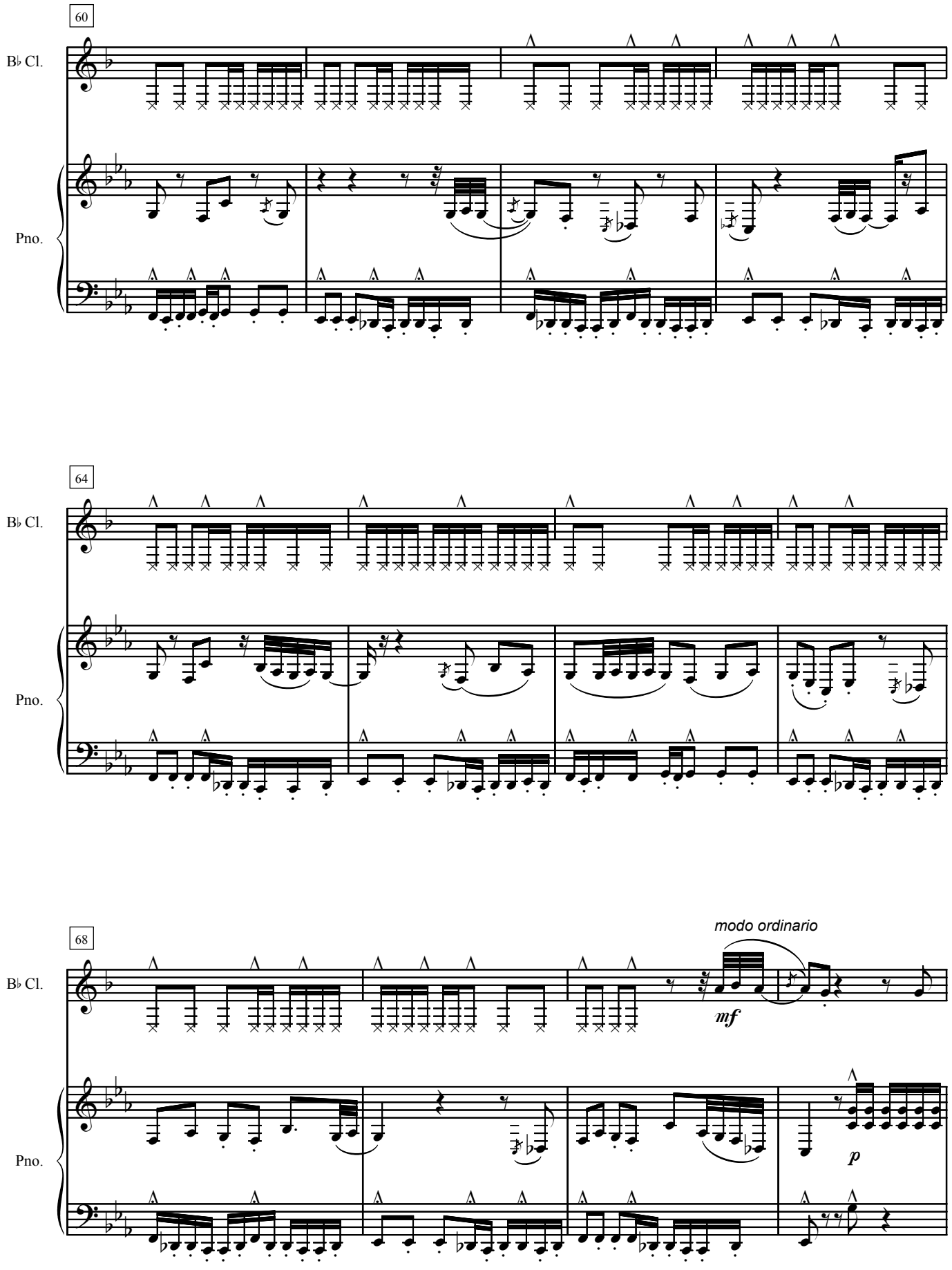


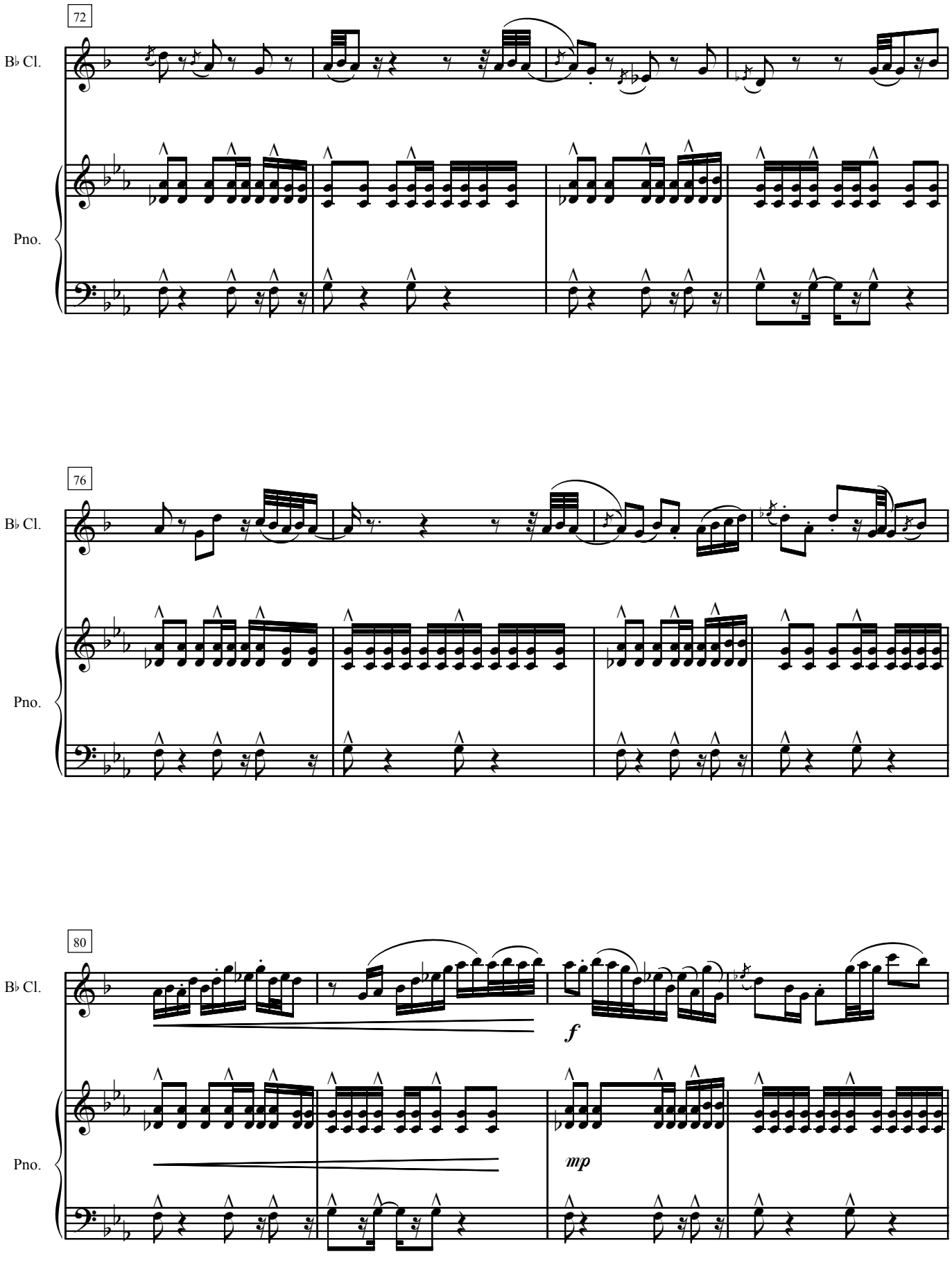

12
B♭ Cl.
Pno.
16
B♭ Cl.
Pno.
mf
3
20
B♭ Cl.
p
Pno.
p
3

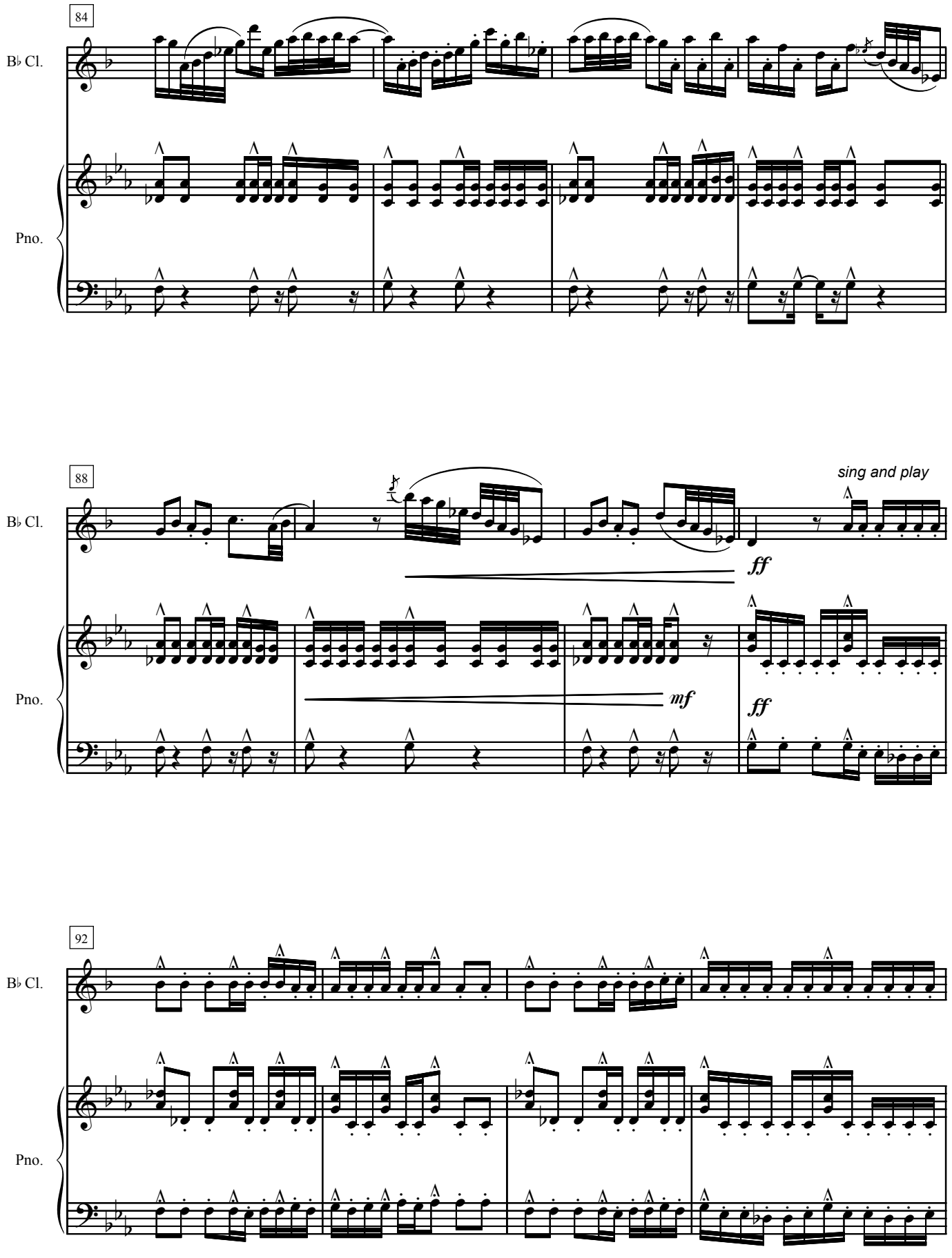

24
B♭ Cl.
Pno.
28
B♭ Cl.
Pno.
mf
f
mf
f
6
3
32
B♭ Cl.
Pno.
mp
3

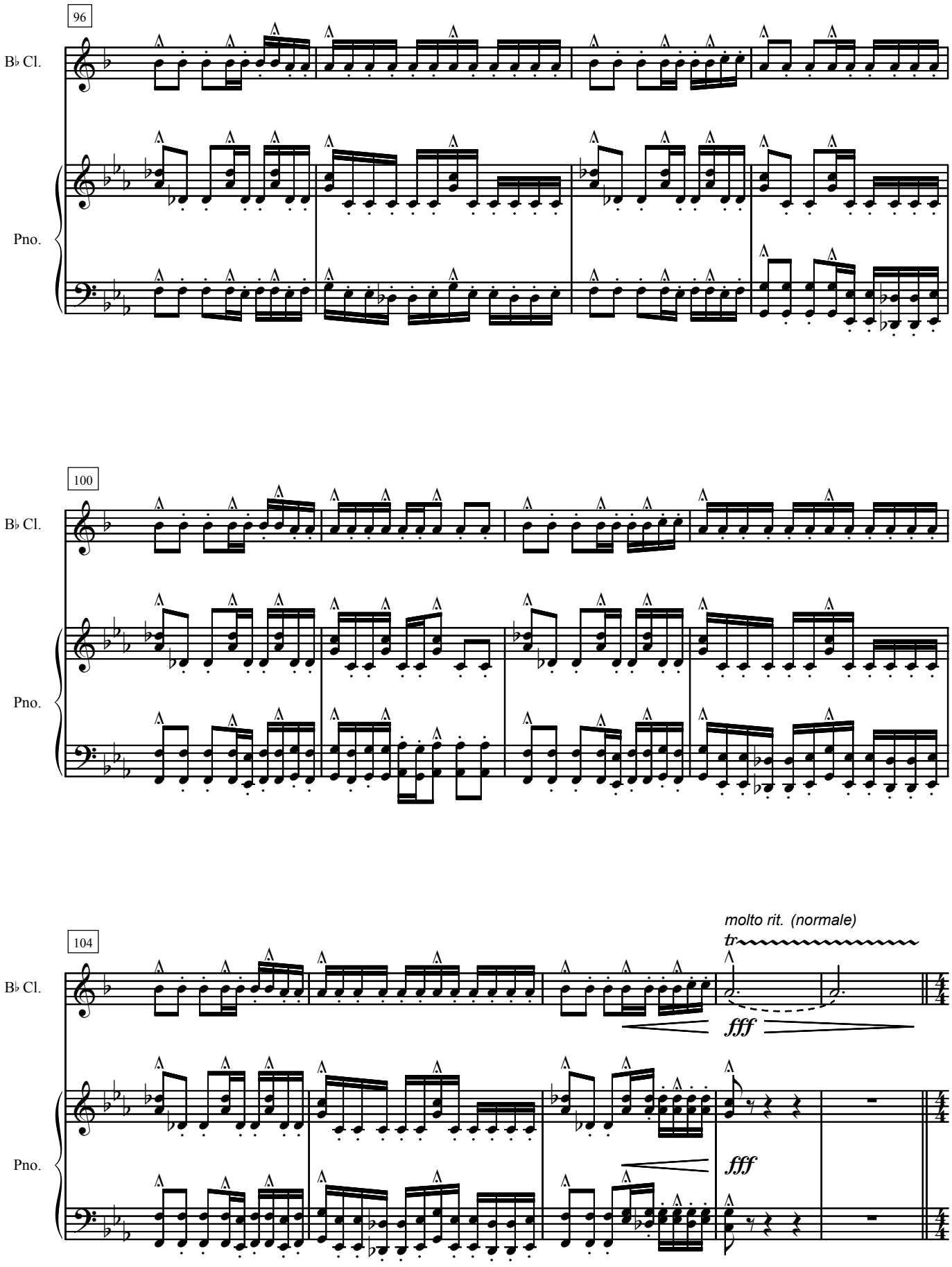

36
B♭ Cl.
Pno.
40
B♭ Cl.
Pno.
dull, breathy tone
f
p
p dolce
44
B♭ Cl.
Pno.
breve
Ped.
ped. sim.

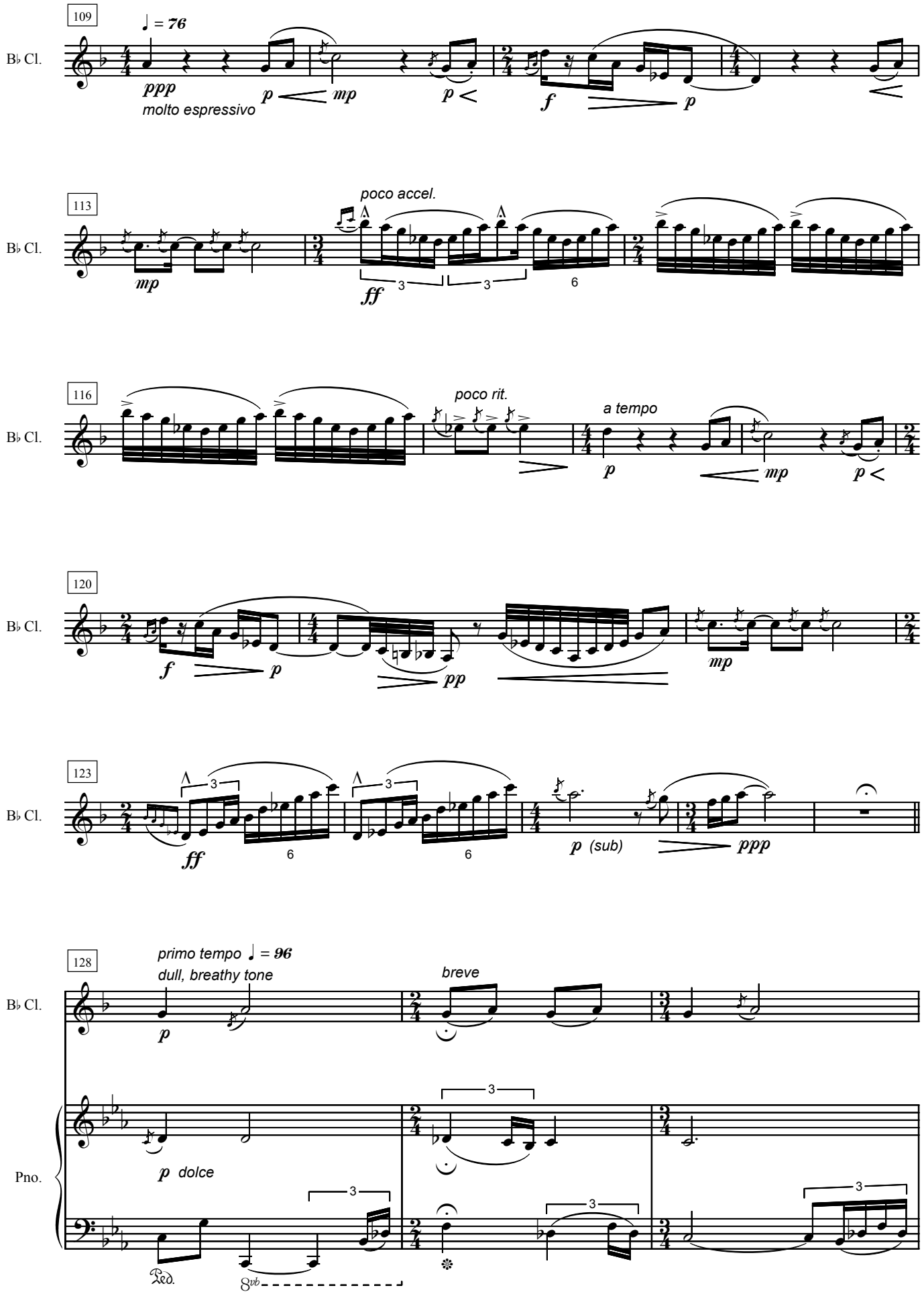

48
breve
tr
3
slap tongue with no sounding note (naturale)
B♭ Cl.
Pno.
p
3
mf
p
(8vb)
52
B♭ Cl.
Pno.
56
B♭ Cl.
Pno.

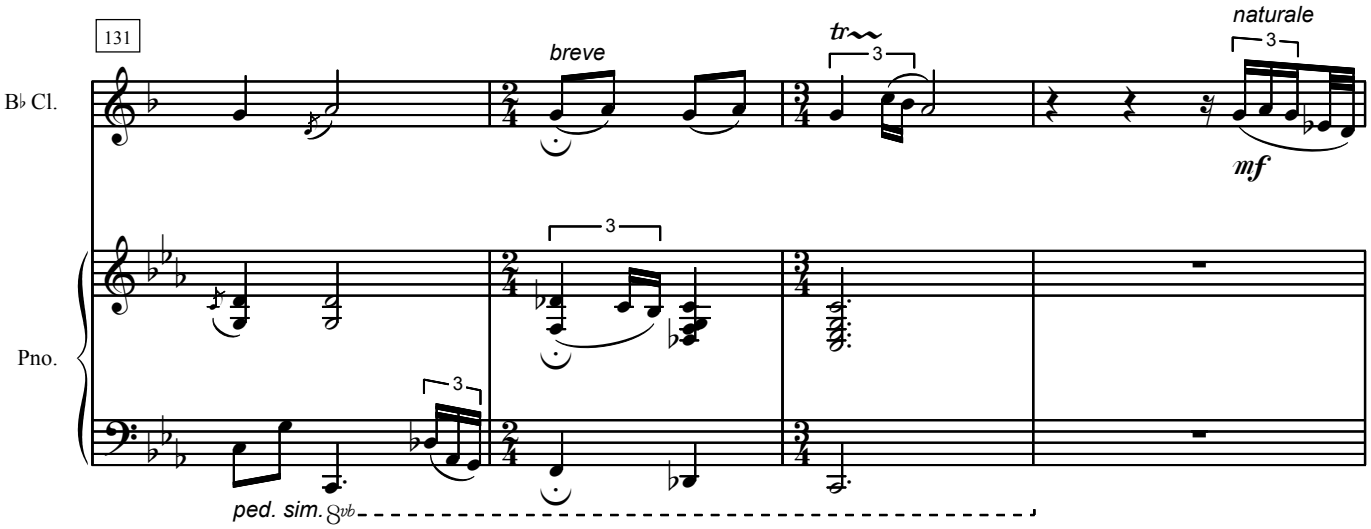

60
B♭ Cl.
Pno.
64
B♭ Cl.
Pno.
68
B♭ Cl.
modo ordinario
mf
Pno.
p

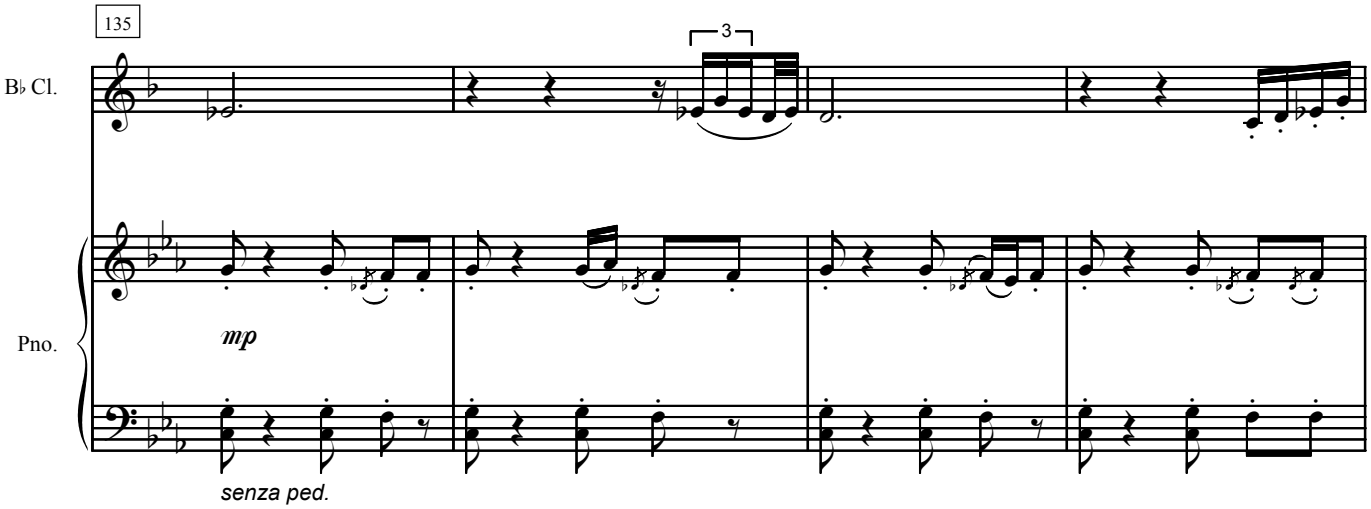

72
B♭ Cl.
Pno.
76
B♭ Cl.
Pno.
80
B♭ Cl.
f
Pno.
mp

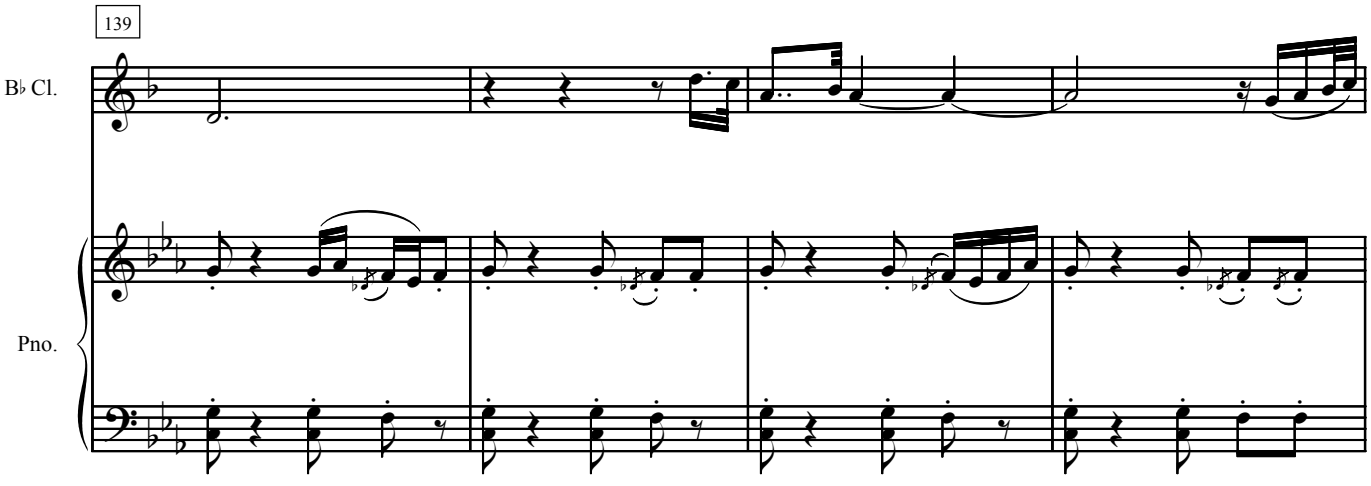

84
B♭ Cl.
Pno.
88
B♭ Cl.
Pno.
sing and play
ff
mf
ff
92
B♭ Cl.
Pno.

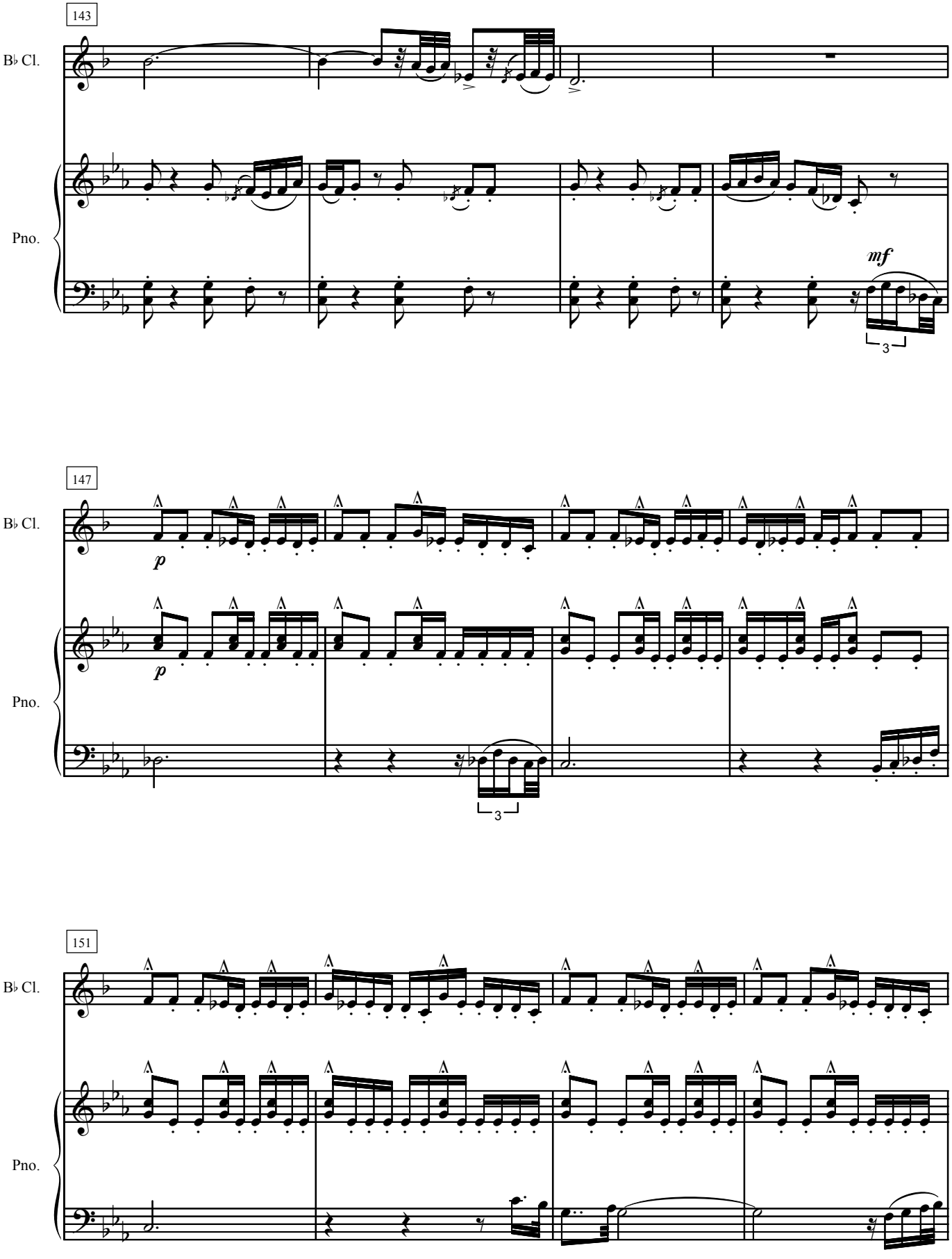

96
B♭ Cl.
Pno.
100
B♭ Cl.
Pno.
104
molto rit. (normale)
tr
fff
B♭ Cl.
Pno.
fff

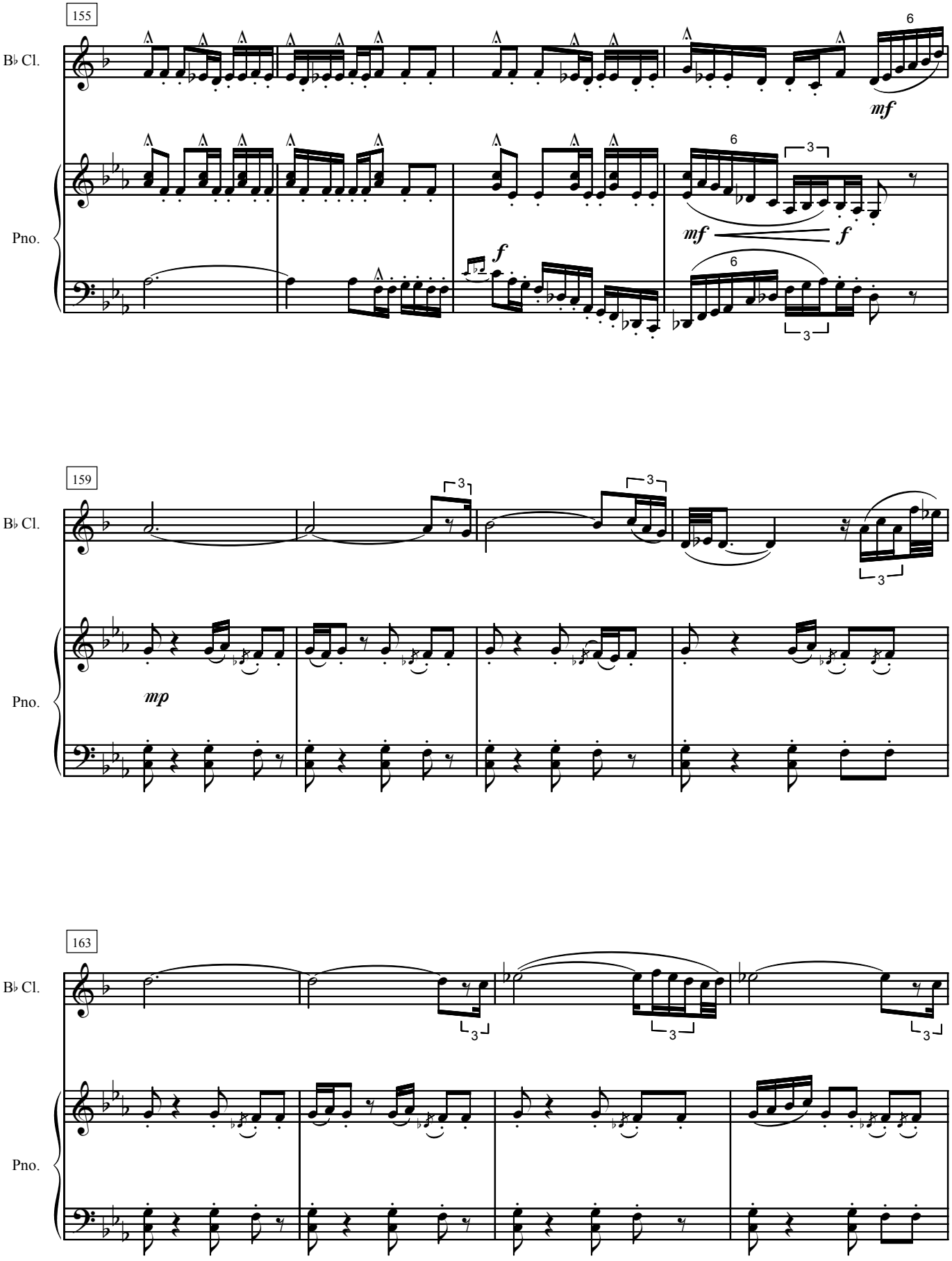

109
♩ = 76
B♭ Cl.
ppp
molto espressivo
p
mp
p <
f
p
113
poco accel.
mp
ff
3
3
6
116
poco rit.
a tempo
p
mp
p <
120
f
p
pp
mp
123
ff
6
6
p (sub)
ppp
128
primo tempo ♩ = 96
dull, breathy tone
breve
p
Pno.
p dolce
3
3
3
Ped.
8vb

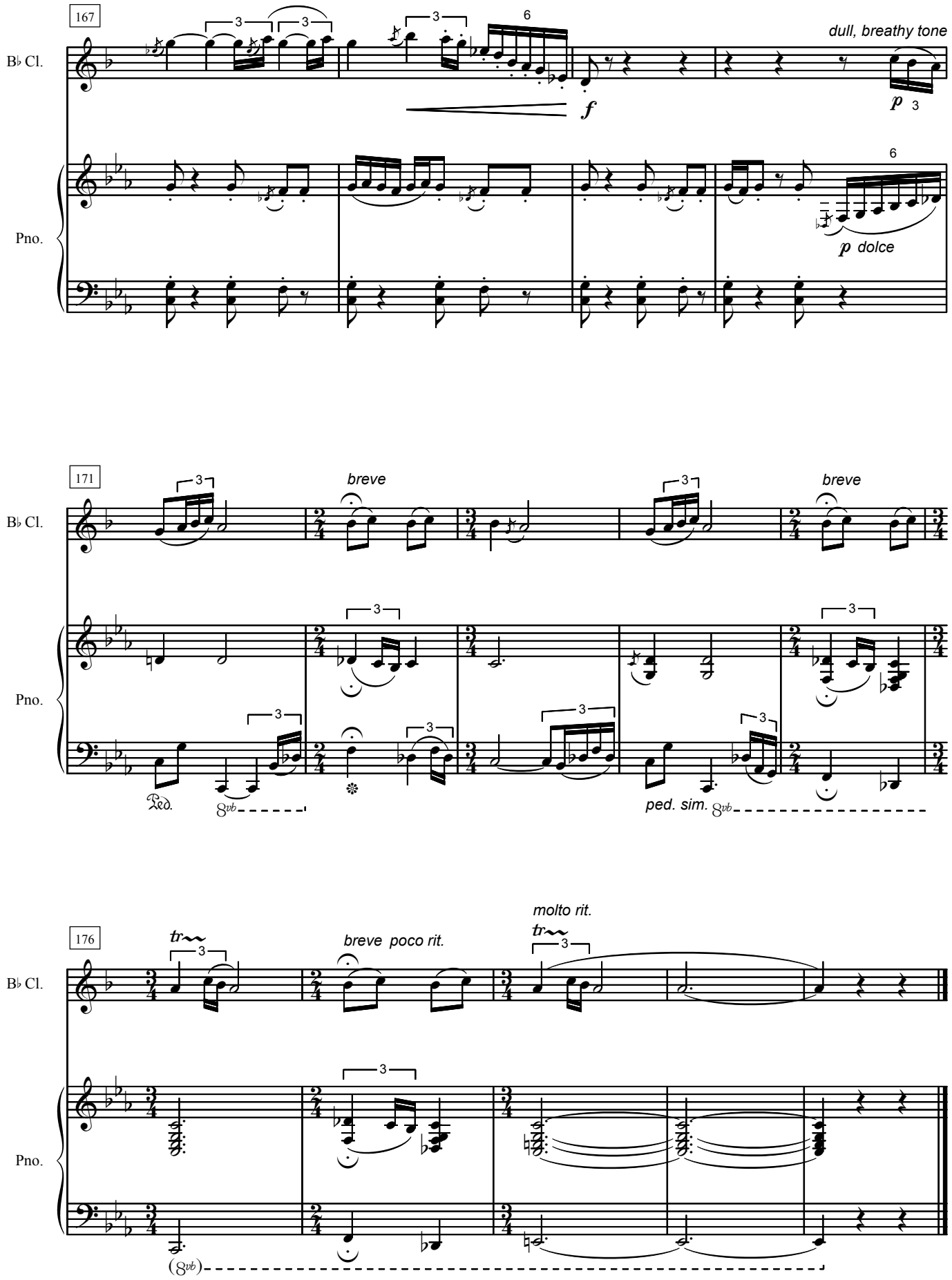

131
B♭ Cl.
Pno.
breve
tr
3
naturale
mf
ped. sim.
8vb


135
B♭ Cl.
Pno.
mp
senza ped.


139
B♭ Cl.
Pno.


143
B♭ Cl.
Pno.
mf
3
147
B♭ Cl.
p
Pno.
p
3
151
B♭ Cl.
Pno.


155
B♭ Cl.
Pno.
mf
f
159
mp
163


167
B♭ Cl.
Pno.
dull, breathy tone
f
p
p dolce
171
breve
breve
Ped.
8vb
ped. sim.
176
molto rit.
breve poco rit.
tr
(8vb)